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ABSTRACT

Continuing work begun at a 1988 conference, the Ocotillo Action/Research Groups of the Maricopa Community Colleges (Arizona) explored ways to enhance the use of educational technology and to capitalize on future developments in the field. These interim reports cover work done in 1989-90 and serve as a basis for the next projected conference. The reports include: (1) "Access" (Dave Dalby and Mike Rooney); (2) "Computer Conferencing" (Bill Snyder); (3) "Directory of Software in the District" (Greg Swan); (4) "Electronic Forms and Approvals" (Ken Roberts and Nonie Bernard); (5) "Ergonomics" (Betty Brinton); (6) "Federal/Foundation Funding" (Fred Gaudet and Bertha Landrum); (7) "Library Issues" (Carmen Coracides and Laurita Moore); (8) "Non-Traditional Instructional Issues" (Betty Field and Naomi Story); (9) "Standards" (Manny Griego and Jan Baltzer); (10) "Support for Technologies" (Betsy Hertzler, Jamie Cavalier, and Lionel Martinez); and (11) "Teaching and Learning" (Billie Hughes and Marti McCorkindale). (SLD)

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Preface

This interim report of Ocotillo is the result of a succession of events beginning in the 1987-88 academic year. During 1987-88, Alfredo G. de los Santos Jr asked several groups within the Maricopa District a series of questions about the future uses of technology in the instructional setting. One of the groups he approached was the District Academic Computer Users Group (DACUG). After discussing these questions, DACUG came to the conclusion that a larger group needed to be involved in envisioning the future of instruction, especially in light of evolving technologies.

In May 1988, DACUG sponsored Technology Retreat '88. Participants at the retreat included faculty from many disciplines, Deans of Instruction, College Presidents, Vice Chancellors, and Governing Board members. Retreat participants identified eight major issues. So much excitement was generated around these issues that commitments were made to extend discussions into the 88-89 school year, to get more people involved.

Subsequent to the '88 retreat, Alfredo appointed us to chair the follow-up process. We spent the summer planning what is now known as Ocotillo. "Action/Research Groups" were established and faculty leadership and administrative support persons were selected for each group.

After a very active year of work involving more than 200 persons, Ocotillo Retreat '89 took place last May and provided an opportunity for a broad spectrum of Maricopa minds to mull over what had been accomplished and to help discover and set priorities for the upcoming work of Ocotillo. Focusing on the recommendations of the 1988-89 Ocotillo groups, the retreat provided significant guidance in choosing the topics for the action planning that has occurred during 1989-90. At the Ocotillo Retreat '89, Alfredo de los Santos introduced the proposed bond election which would finance capital expenditures over a ten-year period. By being required to think about what the district will need in order to accomodate future technology in learning, there has been an even greater momentum created for Ocotillo.

The primary focus of Ocotillo has been, and continues to be, on student learning and the role that technology should play in learning. The casual observer may question how such things as wiring standards and software directories relate to learning. Well, we really can't successfully implement technology in the learning environment without these essential elements in place. Standards allow us to build classrooms and programs so that equipment and skills can transfer district wide; without directories of available software, we cannot preview and then choose the most suitable software for our students. So, in looking at how best to get technology established in our community college system we are not losing sight of our goal of improving learning through technology; clearly, we are working to provide the solid foundation for the technological developments that will come next.

Technology Retreat '88 provided an opportunity to step back and look at the future of instruction and the role of technology in teaching and learning. As we convene in 1990, we will revisit that imagined future and amplify our vision based on the experience and insight the last two years have brought us. During these two years, our commitment to technology has grown to the point at which we realize we no longer need to retreat—we know it is time to advance.

The collective wisdom of the Ocotillo groups is apparent in the reports that follow. The group reports reflect the thoughtfulness of the participants as well as the guidance of group leaders. As we convene in 1990, we will determine how to move forward on the recommendations of each Ocotillo group.

We want to applaud all who have contributed to the work of Ocotillo this year. It is your cooperative spirit and creative genius that makes Maricopa great. A special thanks to the persons who chaired Ocotillo groups, adding Ocotillo to their already busy schedules, and to the administrators who supported each group.

We also want to thank Elizabeth McNeil and Peg Galligan for their time and efforts spent proofreading this document. Pamela Williams deserves many thanks for her long hours at the computer preparing this document for publication.

Jim Walters and Alan Jacobs

Access

by **Dave Dalby, Chair - PC**
Mike Rooney, Coordinator - District

BACKGROUND:

This issue came out of Technology Retreat '88. Access continues to be a major concern and is closely related to the concerns of groups such as the "At Risk Task Force."

CHARGE:

This group will focus on ways that technology can make learning opportunities available to a broader group of learners. It will also look at equity in access to technology for students, faculty, and staff.

Group Participants

James Devere, DIST
Shirley Lowman, DIST
Catherine Osborn, DIST
Linda B. Rosenthal, MCCCD Governing Board
Darlene Swaim, MCC
Robert Watson, GCC

Introduction

Scope and Goals of the Project

The purpose of this report is to identify ways of improving access to learning through use of technology.

One of the goals of the Maricopa Community Colleges is to improve access to learning through technology. The use of technology would assist the district in attaining the district-wide Strategic Planning Goals. Enhanced access must be extended to students, employees, and the general public. This goal will be attained when the colleges can demonstrate improvement in the quality, quantity, and ease of access to desired programs and services.

One of the goals of the Maricopa Community Colleges is to improve access to learning through technology.

To paraphrase the Futures Commission Report, we define the term "access" both as a reason to be served and a climate to be created.

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Personnel issues related to access such as climate, attitude, and prejudice, while important, are not addressed in this report. Issues of furniture, lighting, safety, health, and physical facilities are also excluded.

Definition

Access to learning encompasses technology, policy, procedures, legal statutes, social issues, economic factors, instruction, equipment, administrative processes, physical facilities, services, and climate.

Access to learning with technology involves:

- Identifying, recruiting, serving, and retaining new as well as existing student populations.
- Facilitating the attainment of educational, career, personal enrichment, and life-long learning goals.
- Affecting the kind, degree, delivery, and effectiveness of educational programs and services.
- Acknowledging technical procedures, social issues, legal statutes, economic factors, instruction, administrative processes, physical facilities, equipment, and services.

The scope of this report addresses only the use of technology to enhance the kind, degree, effectiveness, and delivery of educational programs and services.

Full Access to Information

There is a need to develop an over-arching broad policy statement by the Governing Board regarding the infusion of technology into Maricopa's programs and services. A systematic process must be developed to direct and coordinate the implementation and use of technologies.

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Technology must provide easy access to all types of information desired by both local and remote consumers. The desired information

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must be electronically compiled and stored to facilitate this access. Information made available in this manner must be properly protected in compliance with the provisions of the Family Rights of Privacy Act, copyright restrictions, and other ethical and legal considerations. Realistic interpretations of these regulations must be adopted to provide needed access.

Some technologies used to provide access are:

- Communication networks
- Voice
- Video
- Computer
- FAX

Examples of information to be accessed are:

- General information
- College catalogs
- Class schedules
- Directory and organizational information
- Registration
- Calendars
- Job opportunities and position descriptions

Student Access

Technology must provide easy access to information desired by all students. Some examples of the information to be accessed by students are as follows:

Technology must provide easy access to information desired by all students.

One Site Registration and Fee Payment

The technologies must be applied to provide students the opportunity to be assessed, advised, and registered for classes at all Maricopa Colleges from a single location. Within this single site process the student must be able to pay all financial charges.

The technologies must be applied to provide students the opportunity to be assessed, advised, and registered for classes at all Maricopa Colleges from a single location.

To facilitate this the following must be available:

1. Students must have full access to their complete district-wide academic records in a single step. These records include assessment results, course grades, program requirements, and progress.

2. Students must have full access to their complete financial record including scholarships, grants, loans, fees, tuition, and other educational costs.

3. Students must have full access to college catalogs, schedules of classes, college financial aid information, Course Equivalency Guide, and MAPS to facilitate one site registration and fee payment.

Classroom of the Future and Distance Learning

Expanded utilization of voice, video, and computer conference courses is essential for improving access to learners at single and multiple locations.

Assessment and Advisement

Application of technology is essential in the delivery and evaluation of assessment, advisement, and placement services to students.

Support Services

Additional use of technology is needed for the delivery and evaluation of programs and services to diverse populations requiring greater support for academic success. Diverse populations include groups defined by factors such as gender, age, ethnicity, disabilities, disadvantages, and preparedness.

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Recruitment and Retention

Increased use of technology is necessary to identify, recruit and retain diverse population groups underrepresented in Maricopa Community Colleges. District-wide tracking of student progress including grades, achievements, attendance, etc. must occur.

Faculty, Staff, and Administrators

Technology must provide easy access to information for all employees to assist them in achieving excellence in their job performance. Four critical areas for improving access have been identified as follows:

Technology must provide easy access to information for all employees to assist them in achieving excellence in their job performance.

Policy and Procedural Considerations

Broad policies and uniform procedures must be developed to maximize access to information through technology. The following issues, among others, must be addressed:

- To ensure compatibility throughout Maricopa Community Colleges, there need to be more specific standards for the selection, acquisition, installation, utilization, and sustentation of hardware and software.
- Users require greater access to expert personnel in identifying and using technology to meet their needs.
- An overall orientation and clearinghouse to the various technologies, communication networks, and expertise is essential for effective application of technology.

District-Wide Access to Information and Services

Broad policies and procedures are necessary to ensure access to college information on a district-wide basis. Some examples of district-wide information to be accessed are:

- Teaching load and schedule of part-time faculty at all colleges.
- Teaching load, schedule, reassigned time, and office hours of full-time faculty at all colleges.
- Test scores, schedule, fees, grades, degrees, and financial records of a student at all colleges.

- Office location, work schedule, vacation dates, and meetings of faculty, staff, or administrators at all colleges.

- Education, skills, and expertise of employees and applicants for faculty, staff, and administrative positions.

Internal Consulting Services

Consulting services must be available to assist the infusion and utilization of technology. Expertise must be available to analyze the needs and application of existing and potential users. These services will improve access to and effective use of technology district-wide which will result in better serving students.

The following are examples of the delivery of expertise:

- On-line help facilities
- On-site resource persons
- Hot-line and information center services
- Resource development services

Training

More training programs for faculty, staff, and administration must incorporate needs assessments, appropriate delivery of training services, and ongoing evaluation of the entire process. Employees must be both informed and effectively trained about technologies which are available to assist them in their job.

Employees must be both informed and effectively trained about technologies which are available to assist them in their job.

Some examples of technologies that should be addressed by training programs are:

- Computer-assisted instruction authoring languages
- Voice, video, and computer delivery systems
- Classroom of the future technologies
- Electronic mail such as A1, FAX, Bitnet, etc.
- Electronic bulletin boards such as COSY, Vax Notes, etc.
- Electronic data transfer such as uploading and downloading
- Networking of internal and external computing systems
- Information systems such as LIB, SIS, CMS, ADS, CIMS, etc.

Access to External Institutions and Systems

To achieve district-wide missions and goals, technology must provide easy access to external information and services. Two major external resources are:

Technology should facilitate the sharing of information among institutions to help them achieve improved delivery of educational programs and services.

Educational Institutions

Technology should facilitate the sharing of information among institutions to help them achieve improved delivery of educational programs and services. Some examples of information and services accessed through technology from other schools are:

- Inter-library resources
- Voice and video conferencing
- Electronic mail, FAX, bulletin board, Bitnet, etc.

- Student tracking supported by electronic data exchange agreements
- Statewide course equivalency guide, college catalogues, and other curriculum information
- Electronic transcript process

Other External Databases, Systems, and Services

Technology should allow the use of information provided by external agencies to facilitate improved delivery of educational programs and services. A few examples of information and agencies to be accessed through technology are:

- Geographic Information System (GIS)
- Department of Economic Security (DES)
- Department of Transportation (DOT)
- U.S. Census
- Computer hardware and software companies

Effectiveness Measures

To reach the goal of effective teaching and learning through the assistance of technology, an ongoing evaluation of the entire access process is essential. Some questions to be addressed to measure effectiveness are:

> ***To reach the goal of effective teaching and learning through the assistance of technology, an ongoing evaluation of the entire access process is essential.***

- What is the current level of access?
- Are people easily gaining access to what they need?
- Are more persons gaining access?
- How has increased access to information improved the delivery of educational programs and services?

Computer Conferencing

by **Bill Snyder, Chair - District**

BACKGROUND:

For several years we have been looking to implement a computer conferencing system to provide for the public exchange of ideas, as well as to facilitate committee and project work. We have wanted to use this forum for both instructional and organizational purposes. This group represents our latest attempt at this challenge.

CHARGE:

This group will recommend a commercial product or write specifications for a custom computer conferencing system for use district-wide. This group will also plan for the implementation of and training for the use of this system.

Group Participants

K.C. Hundere, DIST
Shirley Lowman, DIST
Jason Pociask, DIST
Donald Snow, SCC
Chris Zagar, GCC

Introduction

Within MCCCD we experience the computer as a "communciations amplifier," a phrase used by John Scully in his book, *Odyssey*.

We experience this in many forms:

- interpersonal and interoffice messaging via A1, among employees
- messaging via VaxMail, among employees or between students and faculty
- access to information, such as SIS, FRS, etc. by managers, dept/div chairs, etc.

In this report, we recommend several enhancements to the existing system which we believe will improve communications among employees and, especially, among students.

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Recommendation

We recommend the adoption of the following goal statement:

MCCCD is committed to using computer resources to provide the following:

- an interpersonal messaging medium among all district employees.
- a conferencing system that can be used by permanent and ad-hoc groups, committees, and study groups of both employees and students.
- an information system for posting and reading announcements for college and district events, want-ads, and other temporary announcements. In addition, this information system will have the facility for storing and reading documents of general interest and importance to the MCCCD workplace: purchasing procedures, RFP's, etc.
- access to outside professional computer conferences.

We further recommend the following implementation steps:

1. For interpersonal messaging, continue to use the VAX A1 system, continuing expansion from the current level of 2000 accounts to the eventual inclusion of all employees.

2. For the conferencing system, we propose one of the following three options:

OPTION A: Use the VAXNotes product which is currently installed on all district nodes.

Advantages:
- already available
- has internodal capability
- has linked messages

- is in Beta test for Mac/Vax connectivity so use of VAX functions from a Mac will be greatly improved
- the new VAXNotes (available this summer) will incorporate direct access of VAXNotes
- from A1 with direct import of messages between the two systems.

Disadvantages:

- uses only a full-screen mode
- assumes VT-100 (or better) emulation
- has been available [for years], but not much used.

OPTION B: Use the EF product which has been developed at GCC for student use. This choice would mean preparing a long-range plan for upgrading EF to be a fully functional conferencing system, in conjunction with GCC programmers.

Advantages:

- has had current success with student use
- is 'our' own, so it can be tailored for MCCCD
- is in the hands of really good programmers

Disadvantages:

- is not internodal
- is an early product, in its first year of use
- needs cooperation among GCC interests and wider interests to succeed in upgrades
- demands answers to the following questions:
  - Will continued support for upgrades and programming be available?
  - Who will fund and how will funding be done?
  - Will the conversion of EF for other than classes change the program to an extent that it will no longer be optimum for class work?

OPTION C: Use of CoSy for student class delivery. This choice would become dependent on a vendor providing support for the CoSy software.

Advantages:

- supports any terminal (not VT 100 dependent)
- relatively simple for the user
- allows binary and text file upload/download

Disadvantages:

- Guelph no longer supports the software
- has a weak text editor for online work.

3. For the Information System, use either VAXNotes or EF, as described above.

4. Embark on an intensive promotion and training campaign to teach users how to use the systems which are new to them. A1 hot-line and training is in place. The main new part would be promotion and training on the conferencing and information system.

5. Design a user interface so that users will have equal access to all three systems: A1, Conferencing, and Information. For example, design an opening screen which all users would get upon VAX log-in, giving the three choices. With the new release of VAXNotes and A1, this interface may be much easier.

6. On log-in, provide the user with information on new mail, new conference notes, and new information bulletins, so the user is alerted to communications activity in all three areas.

On log-in, provide the user with information on new mail, new conference notes, and new information bulletins

7. Provide system programmer support for the chosen systems. This is already in place for A1, but would be needed for Conferencing and Information.

8. Improve Bitnet integration into existing systems. Work is being done in this area. We recommend continuing this direction.

9. One major concern between internal users and external users of the system (especially when dealing with class work) is the dependency on VT-100 emulation or not. The need for a non-VT-100 system is important to external users, as the college presenting course materials over this system will have little control of the type of computer being used by the student at home or other remote site. Internal users for classes or administrative uses will have VT-100 emulation on their machines as normal software if they are already connected to the VAX for A1, SIS, FRS, etc.

Directory of Software in the District

by Greg Swan, Chair - MCC

BACKGROUND:

There have been many calls for a district-wide software directory. One of the earliest of these was in the Master Plan for Instructional Computing.

CHARGE:

This task group will write a plan to develop a computerized directory (database) of microcomputer software in the district. This group will design the directory, plan for the initial collection of data and the continued update of the directory. The two central purposes of this directory are to provide information to individuals so that they can:

A. make better purchasing decisions by being able to contact users of software, and

B. seek technical assistance from current users.

This task group will investigate whether this directory can be used for inventory/audit purposes or for dissemination of current software prices and sources.

Group Participants

Shirley Lowman, District
Charles Moore, MCC
Laurita Moore de Diaz, District
Lauretta Peters, District
Greg Swan, MCC, Chair
Margaret Zinky, PC

Other Participants

Bob Davidson, District
Lori Roberts, District
Jim Walters, District

Key Requirements

A computerized system which provides a directory of software in the district must meet certain key requirements. "Key" requirements are those requirements most necessary to the success of a district software directory system.

GROUP 1: Key requirements which minimize barriers to system use

Any system should minimize the barriers to its use. Specifically, the proposed software directory system should:

1. Allow simultaneous access from all existing hardware platforms: MS-DOS, MacIntosh and VT series terminals whether networked or dial-in.

Key requirement: System should be VAX-based.

2. Support a user interface with which a majority of faculty and staff are familiar.

Key requirement: The user interface should be similar to A1 or other familiar interface.

Key requirement: The system should be accessible through A1. If possible, it should be an enhancement of an existing menu item, not a new menu item.

3. Make software data available on a one-stop-shopping basis.

Key requirement: Data should be stored centrally or through decentralized but linked database.

GROUP 2: Key requirements which secure data

The system should provide security features to help protect the database from accidental or deliberate corruption.

Key requirement: System should implement a security table which determines which users or groups of users have access to each system function, particularly update functions.

GROUP 3: Key requirements which determine functionality

The system should provide features which make it functional. As a result, the system should record certain data, provide needed reports and search for information efficiently.

The committee identified many requirements related to functionality. They are presented in the following appendices:

> *Appendix A — Data Requirements.* Lists data which the committee believes should be captured by a software directory system.
>
> *Appendix B — Reporting Requirements.* Lists printed outputs, including sticky labels, which the committee believes a software directory system should provide.
>
> *Appendix C — Searching Requirements.* Lists search options the committee believes a software directory system should provide.

Although it's not mandatory that all these ***GROUP 3*** requirements be met by a software directory system, the committee believes at least 80% of them should be met.

Key requirement: System should meet at least 80% of GROUP 3 functional requirements.

Alternative Solutions

The committee identified three alternatives for building a district-wide software directory:

> *Alternative 1: Develop a custom program.* The district could assign programmers to develop a custom software directory program or they could contract the work out.
>
> *Alternative 2: Implement the Glendale system district-wide.* Glendale Community College (GCC) has developed a system for tracking software which could be implemented district-wide.
>
> *Alternative 3: "Train" the library system to act as a software directory.* The library system purchased by MCCCD is flexible in its design and may be "trained" to act as a software directory.

Each of these alternative solutions can be made to meet the key requirements defined by the committee. ***Figure 1*** summarizes the key requirements and compares them to the three alternative solutions.

	ALTERNATIVES		COMMITTEE RECOMMENDATION
KEY REQUIREMENTS	Alternative 1: Develop custom program	Alternative 2: Implement Glendale system	Alternative 3: Train library system
System should be VAX-based.	System would be designed to meet this requirement	Requires purchase of DBMAN V for the VAX	System is VAX based
The user interface should be similar to A1 or other familiar interface	System would be designed to meet this requirement	Requires some re-write of system	While A1 interface is preferred, Library interface is standard of sorts
The system should be accessible through A1. If possible, it should be an enhancment of an existing menu item, not a new menu item.	System would be designed to meet this requirement	Requires some effort by A1 system manager	Library system is currently A1 menu item
Data should be stored centrally or through decentralized but linked database.	System would be designed to meet this requirement	Requires purchase of DBMAN V for the VAX	Data stored centrally on VAX located at District
System should implement a security table which determines which users or groups of users have access to each system function, particularly update functions.	System would be designed to meet this requirement	Requires significant system development effort	Has security table
System should meet at least 80% of GROUP 3 functional requirements	System would be designed to meet this requirement	Requires some re-programming to enhance searching capability	May require limited programming

Figure 1: *Key requirements and alternative solutions for providing the district with a directory of software.*

Analysis of Alternative 1: Develop a Custom Program

In any decision to obtain software, two major categories of solutions must be analyzed: custom software solutions and prepackaged software solutions. Typically, custom software should not be developed if satisfactory prepackaged software can be purchased at a reasonable price.

The committee believes that custom software solutions should not be considered at this time, because two satisfactory prepackaged software solutions are available: implement the Glendale system district-wide and "train" the library system to act as a software directory.

Additionally, MCCCD is beginning development of the next generation of administrative systems. This project is likely to consume most MCCCD programming resources over the next few years.

Analysis of Alternative 2: Implement the Glendale System District-wide

Glendale Community College has been MCCCD's pioneer in developing systems to track and control software. As a result, GCC has created a comprehensive system for inventorying and checking out software. Although the primary purpose of this system is to record the location of software, the committee believes it could be adapted to serve as a software directory.

The Glendale system was developed using Foxbase, a dBASE III work-alike (DBASE III, popular with microcomputer users, is a fourth generation language with some relational database capabilities). The system is located on the hard drive of an MS-DOS personal computer in the GCC Center for Innovation. Access to data is controlled by physically limiting access to the MS-DOS computer.

Because the system is confined to a single personal computer, and because it has no software-level data security features, it would seem an unlikely candidate for meeting a district-wide need to share software information. However, recent developments may allow MCCCD to transport this stand-alone Foxbase system to a networked VAX minicomputer.

The manufacturers of a product called DBMAN V, a dBASE III work-alike, have announced their intention to make DBMAN V available for the VAX. With little modification, Glendale's Foxbase code could be implemented on a networked VAX minicomputer. Significant programming effort would, however, be required to implement needed security features, to revise the user interface to be more "A1-like" and to improve information searching capabilities.

DBMAN V is projected to cost approximately $10,000 for initial purchase for a single VAX CPU. Annual maintenance fees are estimated at $2,000. The software is said to be available "any day now," and has been successfully demonstrated at recent trade shows.

Because the Glendale system is a well thought out, proven program, the committee was interested in implementing it on a district-wide basis. However, because of the uncertainty of DBMAN V's availability and workability, the committee counsels waiting until DBMAN V is actually available before further considering the Glendale solution. The committee also expressed concern that the purchase of DBMAN V would add one more language to the list of those which district programmers must understand and support.

Analysis of Alternative 3: "Train" the Library System to Act as a Software Directory

The system used by MCCCD libraries to check books in and out and to provide catalog services is very similar to what a software directory system should be. If the library system is adaptable enough, it could likely be "trained" to meet most of the unique requirements associated with tracking software.

Laurita Moore de Diaz, Lauretta Peters, and Lori Roberts approached the committee with an offer to do a pilot project which would test the library system's ability to act as a directory of software. The purpose of the pilot was to determine the following:

- whether the library system could be flexible enough to accommodate software, and
- whether the accuracy of data in the database could be maintained if users were allowed to order and receive their own software.

The pilot was conducted by the Maricopa Center for Learning and Instruction (MCLI) and Library Technical Services (LTS). MCLI's entire software collection was placed on the library system and, since December 1989, all new orders have been recorded on the library system.

The committee has declared the pilot a success.

Recommended Solution

The committee recommends alternative 3: "Train" the library system to act as a software directory. This alternative may be implemented immediately, with little cost to the district. It has also proven successful in a pilot project. If the committee's recommendations for implementing the alternative (see next section) are followed, the committee believes the project to create a district-wide software directory will be successful.

Considerations for Implementing the Recommended Solution

If a district-wide software directory is to be built using the existing library system, the committee recommends the following:

1. An individual should be given responsibility for matching the Glendale system against the detail requirements presented in the appendices to this report. These requirements should be revised to include any needs overlooked by the committee.

2. An individual should then be given responsibility for comparing the library system against the requirements developed in Recommendation 1. The results should then be presented to the committee. If the library system does not satisfactorily meet the requirements, the committee should examine other alternatives. If the library system does satisfactorily meet the requirements, the committee recommends the following:

3. The library system should be "trained" to address all detail requirements developed under Recommendation 1. (Significant progress was made by the pilot project, but a few issues remain to be addressed.)

4. If needed, a programmer should be assigned to make enhancements which may be required to meet detail requirements developed in Recommendation 1.

5. In conjunction with interested campus volunteers, LTS should be charged with developing cataloging standards for software. LTS is uniquely qualified to develop such standards.

6. The colleges should be allowed to purchase and distribute software in their own unique ways. LTS may offer a purchasing service, but this service should be offered as an option only.

7. Authority to update the library database should rest with LTS or LTS-trained staff at the colleges.

8. Colleges should be encouraged to join the district-wide software directory, but participation must be voluntary. If LTS can make recording software data easy and convenient enough, the committee believes colleges will adopt the system.

9. At the end of one year, the success of the project should be evaluated.

10. If the project is declared a success, college and LTS personnel will be interviewed to identify recommendations for further enhancing the system.

11. Contributors to the project will be recognized.

Appendix A —Data Requirements

A. Title of software
B. Company
C. Discipline (e.g. social science, art)
D. Category (e.g. statistics, paint)
E. Version number
F. Location
    1. "library"
        a) phone number
        b) location
    2. network
        a) zone
        b) server/node
        c) volume
        d) folder/sub-directory
        e) where to request access
G. Operating System required (including version number)
    1. CP/M
    2. Pro-DOS
    3. MS-DOS
    4. MacIntosh
    5. UNIX
    6. VAX VMS
H. Hardware requirements
    1. Memory
        a) Main
        b) Extended
        c) Expanded
    2. Graphics
        a) CGA
        b) EGA
        c) VGA
        d) Hercules
        e) TTL
        f) 4-bit Mac
        g) 8-bit Mac
        h) color
        i) monochrome
        j) etc., etc.
    3. Math co-processor
    4. Amount of disk storage
    5. Special requirements
        a) scanner
        b) microphone
        c) light pen
        d) mouse
        e) digitizing tablet
        f) speakers
        g) digitizing camera
        h) NTSC video output card
        i) NTSC video input card
        j) etc., etc.
I. Date of issue
J. Availability
    1. Available

  2. On-Hold
  3. Checked Out
     a) To whom
     b) Date to be returned
     c) Extension
     d) College or address
  4. Reserved
  5. Reserved for campus/department use only
- K. Description of software functions and features
- L. Purchasing
  1. Vendor
  2. P.O. #
  3. Unit cost

Appendix B — Reporting Requirements

- A. Request for return of materials
- B. Usage rate
- C. Aged software report (shows current software at top)
- D. List of software by discipline
  1. summary
  2. detail
- E. List of software by category
  1. summary
  2. detail
  3. list of software checked out by person
- F. Labels for diskettes, manuals, miscellaneous items
- G. Bar codes for diskettes, manuals, miscellaneous items

Appendix C — Searching Requirements

- A. By subject
- B. By title
- C. By software manufacturer
- D. By keyword(s)
  1. Single
  2. Phrase
- E. By any other data item within database
- F. Advanced query features
  1. Boolean (.and. .or. .not.)
  2. Comparison to value (=, <>, >, <)

Electronic Forms and Approvals

by Ken Roberts, Chair - PVCC
Nonie Bernard, Coordinator - District

BACKGROUND:

At the Ocotillo Retreat '89, this rather old issue surfaced again, and it appeared that the time was right to proceed in the development of electronic forms.

CHARGE:

This task group will develop a plan to implement paperless requisition and other forms while maintaining security, audit trails, and compliance with external regulations.

Group Participants	Other Participants
Carl Couch, DIST	Linda Cañez, DIST
Jim DeVere, DIST	Tom McCann, DIST
Ron Etter, MCC	Bud Pomeroy, DIST
Jim Hogan, SCC	
Kathleen Hurley, DIST	
Mike Murphy, DIST	
Dan Whittemore, DIST	

Introduction

The general task of the 1989–90 Ocotillo Task Group on Automated Forms and Approvals was to prepare a summary document containing specific plans for implementing the recommendations of our task group regarding automating paper-driven systems within our district that involve authorizations. The system/form specifically mentioned was the requisition for purchase order. We were given the option of producing a product, as well as a plan, if we were able.

Task group members were selected based on their interest and/or expertise in various areas important to discussion of automated forms and approvals within MCCCD. Members of the group included: Nonie Bernard, human resources, DSSC (co-chair); Carl Couch, auditing, DSSC; Jim DeVere, information technologies services (ITS), DSSC; Ron Etter, fiscal, MCC; Jim Hogan, faculty, SCC; Kathleen Hurley, auditing, DSSC; Mike Murphy, business services, DSSC; Ken Roberts, assistant provost, PVCC (co-chair), and Dan Whittemore, business services, DSSC. Other contributors to the group were Linda Cañez, human resources, DSSC; and Tom McCann and Bud Pomeroy, ITS, DSSC.

Selecting a Project

The task group began by brainstorming and identifying potential problems to address: training, computer capacity, familiarity of forms, and auditability. The question was raised: "What would happen if we 'turned on' an on-line requisition system?"

Following the brainstorming session, the group set about to determine what it would focus on from that point until April. A list of high-volume and/or high-need areas was developed.

Mike Murphy described the Information Associates Purchasing System, an on-line requisition system already in use for inputting requisitions to the financial records system (FRS). Several group members expressed concerns about using the system district-wide: accessibility, complexity of logging on, security, and audit trails. Since document approvals are made by level, not by name, questions were raised regarding the ability to make approvals for other campuses.

Jim DeVere presented an overview of the Schedule, Allocate, and Monitor (SAM) project, describing the use of SAM for controlling class, room, and faculty schedules. SAM is a dynamic system that can be monitored throughout the semester. GCC began piloting SAM this fiscal year; five departments used SAM to develop their spring schedules. The deans of instruction have established teams at each college to implement SAM. The book-order process was also of interest; however, according to Jim, book orders will have to wait until some of the processes more basic to scheduling facilities and personnel are operationalized.

Ron Etter described the Lock Box, which MCC piloted with Valley Bank. Students mail payments to a post office box, and Valley Bank picks up and processes the transactions, at a cost of about 14 cents apiece. Benefits to the college include overnight deposit of monies and shorter lines at MCC's fiscal office. The college receives approximately 14,500 checks in a semester, and Ron indicated that he expects improvement of NSF-check collection, better security of assets, better audit data, and the security benefit of reduced cash on hand.

Nonie Bernard brought a number of human resources and educational development forms and processes, including professional growth, request for personnel services (RPS), absence reporting, and position posting request.

After weighing the pros and cons of the various candidates for action, the group decided to pursue the position posting request. The primary reasons for the decision were (a) the posting request is utilized districtwide; (b) an automated posting request system (PRS) was already being developed by information technologies services (ITS) with human resources; and (c) the relative monetary risk to the district was low compared to that of a requisition for purchase order system.

The Automated Posting Request System (PRS)

Description of the System

The automated posting request system (PRS) is being developed to serve two primary needs: (a) to reduce paper, and (b) to reduce the time required to process a request to post a vacant position within MCCCD. The primary goal of the system itself is to keep a record of the requests to post positions that come from various areas of the district. The system accomplishes this by maintaining posting request information on disk files. According to information entered on terminals or stored in computer files, it sends messages, via A1 mail, to responsible employees in different areas.

The automated posting request system (PRS) is being developed to (a) reduce paper and (b) to reduce the time required to process a request to post a vacant position within MCCCD.

Responsible employees include: (a) requestor or initiator (college or district office); (b) college president, center provost, or district vice chancellor; (c) district budget officer; (d) wage and salary manager; (e) employee relations manager; (f) employment officer; and (g) system manager/prime user (district person responsible for security of and access to the system).

The computer generates and delivers A1 messages as follows:

1. A message is sent, requesting the responsible person to interrogate the system regarding a position requested.
2. If no action is taken by the person above, a reminder message is sent daily.
3. A message is sent to the initiator, informing him/her that a reminder message was sent.
4. A denial message is sent to the initiator if any responsible signer responds with a "no" on screen 3 (this terminates any further messages).

5. When the request is finalized, a message is sent to the initiator.

6. If a responsible person wants others to be sent the same messages he/she receives, then a distribution list can be set up via the password file. This is helpful if the responsible person is not available for a period of time and someone else is taking his/her place.

PRS currently maintains or interrogates three data files for interactive processing, message sending, and reporting:

1. Position request file. This file contains information from screens 1, 2, and 3 of PRS (these screens replace the Maricopa Community Colleges Employment Department Position Posting Request form).

2. Password file. This file contains the password information utilized by the online program to determine user privileges and addresses to send messages. The system coordinator (prime user) is responsible to enter and/or update the password information.

3. Audit file. This file keeps a log of updates to the position request and password files.

The programs utilized by PRS have two functions:

1. File maintenance. The user interacts with screens to add and revise information in the position request and password master files.

2. Reporting. These programs provide the user with information to make decisions regarding position requests. Some segments of the reporting function display information via screens, while others produce hard-copy reports for analysis.

How PRS Is Used

After a college or district department identifies a vacant position, and an authorized person (requestor) determines to pursue filling the position through the employment process, the requestor communicates all pertinent information to his location's designated initiator, by completing and forwarding a Position Posting Request form or by some other means agreed to at the location.

The automated posting request system (PRS) comes into play at this point. The designated campus or district division initiator inputs the position request using the automated position request system (PRS); and information is updated and approved or denied by various responsible individuals, in the following order:

1. The initiator (college or district office) inputs the position request information onto PRS screens 1, 2, and 3, and then "signs off." The act of signing off prompts an A1 message to be sent to the responsible employee at the next level (president/provost/vice chancellor).

2. The college president, center provost, or district vice chancellor, upon receiving an A1 message, reviews the request and approves

or disapproves. Approval sends an A1 prompt to the responsible employee at the next level (district budget office).

3. The district budget officer, upon receiving an A1 message, reviews the request and approves or disapproves based on budgetary parameters. Approval sends an A1 prompt to the responsible employee at the the next level (wage and salary manager).
4. The wage and salary manager, upon receiving an A1 message, reviews the request and approves or disapproves based on wage and salary parameters. Approval sends an A1 prompt to the responsible employee at the next level (employee relations manager).
5. The employee relations manager, upon receiving an A1 message, reviews the request and approves or disapproves based on employee relations parameters. Approval sends an A1 prompt to the responsible employee at the next level.
6. The employment officer, upon receiving an A1 message, reviews the request for completeness. After confirming that the request is complete, the request is printed and the posting process begins, thus ending the cycle of the posting request.

If, at any point in the review-and-approval hierarchy, the request is disapproved, then the initiator is notified. At that point, traditional means of communication should commence, via telephone calls, A1 messages, etc., to identify and/or resolve the issue that caused the disapproval.

Access to PRS from A1

One of the chief complaints raised about using district computer systems has been the the complexity of logging on and off, and the cumbersomeness and inconvenience of moving back and forth between them and A1. That complaint has been addressed in the development of the automated posting request system (PRS).

The automated posting request system can be accessed directly from A1, using a two-letter command and the individual's PRS password. In other words, a college president who receives an A1 message to act on a position request can go directly to PRS without logging off A1, look at the request, review and approve or disapprove it, and then go right back to A1.

Status of PRS and Plan to Test

At the time this document was submitted for publication (April 11, 1990), PRS was ready to test. An internal (district office), 2-week test is scheduled for April 16 through April 27. After the internal test is completed and necessary changes are made, an external test will be conducted with PVCC. If all goes as planned, testing will be completed by May 18, and the results will be reported at the Ocotillo Advance on May 21 and 22.

If all goes as planned, testing will be completed by May 18, and the results will be reported at the Ocotillo Advance on May 21 and 22.

Summary

The general task of the 1989–90 Ocotillo Task Group on Automated Forms and Approvals was to prepare a summary document containing specific plans for implementing the recommendations of our task group regarding automating paper-driven systems within our district that involve authorizations, with the option to produce a product. Task group members were selected based on their interest and/or expertise in various areas important to the discussion of automated forms and approvals within MCCCD.

Following brainstorming and discussion of problems and need areas, the group decided to pursue the automated posting request system (PRS) as its project.

The project is currently at the testing stage; the results of the tests will be presented at the Ocotillo Advance on May 21 and 22.

Recommendations

The 1989–90 Ocotillo Task Group on Automated Forms and Approvals makes the following recommendations:

1. The automated posting request system (PRS) should be tested fully, and the group should monitor feedback regarding its use. Problems associated with using the system should be identified and addressed.

2. A priority list should be established and maintained in cooperation with the technology users groups, for automating systems within the district.

3. The task group should continue to exist for the purposes of identifying areas of need within the district and discussing concerns and developments in the area of automated forms and on-line approvals.

Ergonomics

by **Betty Brinton, Chair - District**

BACKGROUND:

In the last ten years there has been increased concern about the quality of the setting in which learning with technology take place--the room, furniture, sound, lighting, VDT emission, and other similar concerns constitute the focus of this group.

CHARGE:

This group will research and clarify the central ergonomic issues for the use of instructional technology and will make recommendations for the design of facilities and the purchase of technology hardware with respect to these issues.

Group Participants

Carol Clocksin, DIST
Lionel Diaz, DIST
Jim Mansfield, DIST
Sherry Shroyer, SCC
Darlene Swaim, MCC

Introduction

Ergonomics is a science that seeks to adapt working conditions to the needs of the worker. Similarly, to facilitate teaching and learning, an educational institution should adapt the learning environment to the needs of the teacher and the learner. Presently, the delivery of instruction may be dictated by the short-sighted, inflexible design of the classroom, making it extremely difficult for the delivery of technology-based instruction.

an educational institution should adapt the learning environment to the needs of the teacher and the learner.

Many areas must be taken into consideration for the health, safety, comfort, and productivity of staff and students. Areas included in ergonomics issues are furniture, lighting, acoustics, air circulation, wall surfaces, floor coverings, and health issues. When the primary function of a facility is the use of technology to serve students or staff, initial appropriate design is much more cost effective than retrofitting an existing classroom modeled after the one room schoolhouse.

Lighting

The most common complaint of VDT users is, overwhelmingly, eyestrain. Asthenopia (eyestrain) is a term describing a variety of symptoms of visual discomforts, including burning, itching, tiredness, aching, soreness, and watering. It is evident that any one of these symptoms, much less a combination of them, could pose a hindrance to effective learning by students in classrooms that use computer terminals as instructional tools.

The greatest contributing factor cited as contributing to eyestrain is improper lighting. Attention to proper lighting when designing a facility for computerized education can reduce many of the symptoms of eyestrain, and therefore provide an atmosphere for students that is more conducive to learning.

The greatest contributing factor cited as contributing to eyestrain is improper lighting.

A major problem in working with VDTs is that the eye has trouble adjusting to conflicting levels of light between the common, brightly illuminated room, and the lower light level of the VDT screen. To work toward balancing this disparity, **lower light levels are recommended** for rooms in which VDTs are located.

Overall, lighting for a computerized facility should generally be at the lower end of the scale of 30-150 foot-candles. (One report suggested a level of 10 to 20 foot-candles.) One foot-candle is equivalent to about one lumen per square foot. The lower light level serves two purposes: 1) it keeps contrast between room light and screen light to a minimum, as well as making the characters on the VDT screen easier to read, and 2) it reduces the screen glare created by bright lighting.

Screen glare, a prominent factor contributing to eyestrain, can be directly attributed to improper lighting. Too bright light levels reflect from surfaces such as reading materials into the eyes. Bright, uniform ceiling lighting also bounces off the ceiling and walls into the eyes. Over prolonged periods, the intense light can blur objects and cause the eye's retina to lose the precise adjustment it needs for clear vision. To reduce this problem, an added design element—**indirect or task lighting—is recommended**. This type of lighting also eliminates direct light striking the VDT screen, which, according to eye experts, should be avoided.

Another source of screen glare comes from unprotected windows. While windows are suggested as enhancing the environment, for a VDT setting they should be treated with coverings that can control the angle of light. Sources also agree that the VDT should never face a window, but be kept at right angles to it.

According to the studies reviewed, the quality of light is just as important as the quantity. Lighting quality affects visual acuity, performance, fatigue, and general health. The wrong light has been credited with contributing to a variety of symptoms, including tooth decay, colds, headaches, indigestion, and arthritis.

The most common light in use in public buildings today is the "cool white" fluorescent bulb. These lights do not emit the beneficial "near ultra violet" waves essential for human well-being. A study conducted at the Austrian Center for Sports Medicine concluded that **full spectrum lighting improved work capacity**, decreased the heart rate, and increased oxygen intake. While lighting that more closely simulates the full spectrum range of natural daylight is more expensive, there are indications that this type of lighting positively affects people's moods. More controversial theories speculate that growth, attention span, visual acuity, and endocrine system functioning are improved when full spectrum light is used. Buyers are cautioned that, while many manufacturers claim their product meets the classification of full spectrum, only a few true full spectrum fluorescent light manufacturers exist.

More controversial theories speculate that growth, attention span, visual acuity, and endocrine system functioning are improved when full spectrum light is used.

Another, more visible problem with fluorescent lights is the "60 flickers per second" in which the light appears to vibrate. These lights are usually installed in pairs so that while one flicks off, another is on, frequently making the flicker unperceived consciously. However, the flicker may still be perceived unconsciously, and has been credited with causing headaches, eyestrain, fatigue, and may even be a factor in spurring seizures in epileptics. Additionally, since VDTs also produce flickering at various rates (depending upon the machine), the combined flickering of VDT screen and lighting can create a maximum source of eyestrain for students using VDTs.

Glare reflecting into a VDT user's eyes not only leads to excessive eyestrain, but also causes the user to adjust posture, which further contributes to the physiological complaints voiced by VDT users.

In settings where glare and screen reflection cannot be effectively eliminated, glare shields which fit over the screen are recommended. Some VDT users complain, however, that these shields reduce screen clarity. Screen shields can be purchased at a cost of approximately $35 per machine for a mesh screen, to $59 for a treated glass filter, or $129 for a screen that eliminates glare and protects against controversial low-level radiation emissions. Needless to say, the more expensive the screen, the better the resolution. Whichever screen is considered, when comparing screen costs to proper initial design of facilities, design is the obvious winner.

Product materials from manufacturers of lighting equipment and screen shields have been provided to the Ocotillo committee chair.

While the argument continues as to whether there are any long-term visual impairments connected with video display terminals, agreement that VDTs cause additional stress to the eyes appears to be widely accepted. Beyond proper lighting to protect the eyes, experts recommend two important exercises: 1) frequent blinking to reduce drying of the eyes, and 2) frequent glancing away from the VDT to allow the focusing muscle of the eye to adjust to distant objects.

Furniture

Appropriately designed furniture is available from vendors on the State Bid List. One in particular, Goodmans Design Interiors, also have interior designers available to assist in designing an environment. Probably the two most important furniture attributes for computer furniture are **recessed keyboards** and **ergonomically designed chairs**.

the two most important furniture attributes for computer furniture are recessed keyboards and ergonomically designed chairs.

The keyboard should be placed so that the upper arm can hang vertically and the forearm/wrist can be parallel to the floor. Chairs should be easily adjustable for seat and backrest height and, on carpeted floors, should have casters to provide ease of glide without hazard. Seats should be gently rounded on the front to avoid interference with blood flow to the lower legs.

Computer tables should be adjustable when needed for proper screen and keyboard heights and adequate legroom. To avoid possible glare and unnecessary movement which can cause neck, shoulder, or back aches, a document holder should be provided and should be adjustable to the height, distance, and angle of the screen.

Noise

It is unlikely that classroom noise levels would exceed the Occupational Safety and Health Administration standards; however, background noise generated by HVAC systems and external noise through exterior walls and roofs can make the delivery of some technology-based instruction impossible. Noise levels can be abated by installing acoustically absorbent room finishes such as Armstrong's Soundsoak 85, carpeting floors with non-static carpet, and hanging drapes at existing windows.

VDT Emissions

The Ergonomics Committee includes the following information on VDT Emissions to raise awareness and not to create controversy.

The National Institute of Occupational Safety and Health, the U.S. Army Environmental Hygiene Agency, and other such governing bodies have measured radiation emitted by VDTs. The tests show that levels for all types of radiation are below those allowed in current standards. However, because of widespread controversy, NIOSH and others are continuing to conduct major studies to thoroughly investigate any potential problems.

A computer monitor emits radiation of various kinds. The electron beam produces X-Rays. The activated screen phosphors produce visible light, ultraviolet light, and infrared light. The electrical components emit static electricity and radio waves. The simultaneous exposure to several kinds of radiation at the same time has a synergistic effect greater than when each form of radiation acts independently.

The big question is: How much radiation is too much? Do we really know how much electromagnetism and low level radiation is generated in a classroom containing 30 computers over an 8-hour period? The Committee recommends proactive measures be taken and monitors be tested and the backs be shielded if they are emitting even the smallest amount of radiation. Radiation factors should also be written into purchasing specifications.

VDT Computer Monitor Safety

Current Situation

There will be approximately 45 million Video Display Terminals (VDT) [Computer Monitors or Terminals] in the workplace by 1990. The advent of the VDT has given rise to health concerns about their use. Many scientific studies have been done in response to worker complaints. Problems associated with VDT use are now considered a major public health dilemma, and the projected legal and health costs to companies and organizations is astronomical. It is a given reality that most VDT users are women who are receiving minimum wages and who are not represented by unions. Therefore, these particular health problems are occurring among a group of workers with few protections and powers of relief.

Computer Monitor Radiation Emissions are made up of the following:

1. The electron beam produces X-Rays.

2. The activated screen phosphors produce visible light, ultraviolet light, and infrared light.

3. The electrical components emit static electricity, magnetic, and radio waves.

Legally, the U.S. has recognized the VDT as an electronic device capable of emitting electromagnetic radiation.

Health problems associated with VDT's, in particular reproductive problems, occur in clusters. This is taken as added weight to the circumstantial evidence linking computer monitor use with miscarriages and stillbirths. The probability that such clusters happen due to chance is 6 in a million. The computer terminal is the ONLY common factor in these reported clusters.

It has been known for more than a century that electromagnetic radiation can produce cataracts. Worker's compensation and legal liability have already been determined by the courts in cases of "computer cataracts."

Computer monitor health problems which have received the most attention so far are computer cataracts, marked rise in miscarriages, burned eyes, skin cancers and rashes, sleep disturbances, joint strain injuries, tinnitis, carpal tunnel syndrome, tenosynovitis, eye spasms, visual impairment, depression, digestive disorders, high blood pressure, chronic headaches, liver damage, inhibition of the thyroid, personality disturbances, premature aging, photosensitive epilepsy, nausea, neo-natal deaths, bone tumors, angina pectoris, acute myelogenous leukemia, damage to autonomic nervous system, and cancer.

INFOWORLD (OTT STUDY) reports a study showing that red blood cells exposed to VDT radiation form clumps (called aggregations), causing a less efficient oxygen and carbon dioxide exchange. Identification of such a physiological effect will help in determining causative factors and possible solutions. This OTT STUDY proposes a system of FULL SPECTRUM lighting (sometimes called daylight) be used in computer areas, since exposure to this type of light helps break up blood aggregations. This is one example of a simple, inexpensive solution to lessen harmful effects of VDT exposure.

One major surprise is that the health effects of VDTs were NOT STUDIED nor evaluated prior to being introduced. The result was a rise in lawsuits over this issue. Workers believe they are entitled to a safe workplace. Workers' compensation boards have now clearly recognized that VDTs DO CAUSE severe visual, muscular, and joint disorders, and have taken steps to provide for some relief.

European standards for computer terminal safety are far stricter than in the United States. (American manufacturers of VDTs cannot freely export their terminals to Germany because their products do not meet Germany's safety standards.)

Some Ways To Head Off Trouble

We need to make sure our MCCCD workplaces are as safe as we know how to make them.

We need to make sure our MCCCD workplaces are as safe as we know how to make them.

RECOMMEND: A survey to discover what health problems and concerns MCCCD may already have in this area.

RECOMMEND: Meet and Confer take up health issues re: computer monitors as an item for discussion.

RECOMMEND: Campus Computer Committees and District buyers be alerted to request for purchase: SHIELDED MONITORS only. (This precaution in purchasing adds only a very small amount to costs.)

RECOMMEND: Computer monitors: For greatest possible relief from problems associated with the eyes, only high resolution COLOR MONITORS should be considered. Why? Because the human eye needs relief from looking at one color for any length of time. Most word processors allow easy change of background and letter colors. Users should be informed as to the best colors for their eyes.

Screen Colors: Gray background, off white letters. Relief command lines in Rust, Amber, or Blue Gray. These combinations are least likely to cause eyestrain.

Worst Monitor Letter Color Combination:
Bright Blue on Black
Bright Green on Black
White on Bright Blue
Any Red— Yellow combination

Best Monochrome Color Combination:
Amber on Black

RECOMMEND: Campus Computer Committees and District buyers be alerted to request ERGONOMICALLY SOUND furniture and lighting only. (This precaution in purchasing often saves costs, since Ergonomically sound furniture is also more efficient and versatile.)

RECOMMEND: Room area layout:

Design: Rooms and work areas need to be quiet. Flow patterns need to consider optimum lessening of disturbances.

Color: Colors need to be chosen for their light-muting and calming effects. Colors such as Yellow, Orange, Red, and Middle Greens should be avoided. Muted Blues, Slate Grays, Charcoal, Mauves, Bleached Rust, Mushroom, and Beige should be chosen for their calming effects on workers and their relief effects to the eyes. Computer room walls would be best painted or covered in a mid-value top color and a darker value bottom color. This division in itself produces an expansive, calm mood. Paying attention and choosing painted wall colors carefully costs NOTHING MORE.

Windows and artwork are necessary to break up the view.

Lighting should NEVER be overhead in a computer room. Indirect, below the waist, at least

below the head, lighting is best.
Some lighting problems can be effectively relieved by purchasing inexpensive "gooseneck" type lamps.

Lighting should NEVER be overhead in a computer room.

Furniture should be purchased with the intended computer system in mind. CAD-CAM needs are quite different from clerical needs. ADJUSTABLE furniture is the only type to consider. Beveled, wooden rollout, adjustable keyboard trays with WRIST RESTS are extremely important.

Monitor Carriers should be used for the most range in adjustments for the user. Cable troughs would prevent tripping accidents. Desks should be on casters for repair and change of equipment.

Summary

Fortunately, many of the solutions to safety problems people encounter working with computer terminals and monitors are inexpensive and easily dealt with. A major factor in being able to meet these concerns is to be aware of the problem. With good communication to buyers and campus computer committees, some of the safety and health concerns dealt with in this paper can be alleviated without the costly legal means that have devastated other organizations.

RECOMMEND: Purchase of only high resolution MULTI-SYNC type monitors for greatest possible adjustable color combinations to relieve eyestrain and headaches. (This type of monitor is also the most versatile and easily changed to match increasing resolution and varied frequency graphics boards: a more efficient use of funds.)

RECOMMEND: Purchase of high resolution graphics boards to drive monitors. SUPER VGA is the current standard. If you have a wide-range Multi-Sync Monitor, however, you need only replace the graphics board to make future changes. (NEC MULTI-SYNC 3D is a good example of a current, shielded, extremely wide-range frequency monitor.)

Conclusion

The growth of technology and tightening financial support requires us to plan carefully and create optimal teaching and learning environments that meet the needs of the present day technology, and are also flexible enough to accommodate new technologies, instead of merely building classrooms.

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Federal/Foundation Funding

by **Fred Gaudet, Chair - GWCC**
Bertha Landrum, Coordinator - District

BACKGROUND:

Based on recommendations of last year's "Alternative Funding" group, this group is working on using external funding to supplement existing funding for our technology agenda.

CHARGE:

This task group will develop a plan to monitor and respond to external funding opportunities.

Group Participants

John Bradley, DIST
Joyce Elsner, GCC
David Irwin, CGCCC
Robin McCord, CGCCC
Joseph Pearson, SCC
Fred Stahl, SMCC
Liz Warren, DIST

Task

The task of the Ocotillo External Funding Group was to "develop a plan to monitor and respond to external funding opportunities." The task group recommends that the Maricopa County Community College District adopt a coordinated approach to the utilization of federal and foundation grants and awards.

Recommendations

1. It is recommended that the District Support Services Center support campuses in this effort by the following:

    1.1 Monitor federal and foundation funding opportunities.

        1.1.1 Network with granting agencies, foundations and the congressional delegation to identify resource availability and criteria.
        1.1.2 Disseminate grant/award information to the campuses and centers in a timely manner.
        1.1.3 Expand existing database to include electronic access to multiple federal agencies and to provide ease of use by college/district personnel.
        1.1.4 Develop a calendar and annual plan for grant activities tied to college and district-wide strategic planning.

    1.2 Support campus responses to grant opportunities.

        1.2.1 Identify a cadre of consultant grant writers.
        1.2.2 Develop generic institutional and campus-specific descriptive text and forms data.
        1.2.3 Establish a presence in Washington to represent the campus in regard to proposals that have been submitted for funding.

    1.3 Staff a grants coordination office to facilitate provision of support services.

2. It is recommended that the Colleges/Centers support this effort by the following:

    2.1 Designate a person responsible for local coordination of federal/foundation grants.
    2.2 Communicate intent to respond to a given grant opportunity.
    2.3 Coordinate efforts and proposals when more than one campus chooses to respond to the same grant opportunity.

3. It is recommended that the financial support for the above process be identified and allocated as follows:

    3.1 Reallocate a percentage of the indirect costs which are currently added to each federally funded project.
    3.2 Allocate funds to each College/Center on an as-needed basis for underwriting grant proposal writing.

Matrix for Federal/Foundation Funding

Recommendation/ Objective	Activity	Key Office(s)	Time Frame
1. Support by District Support Services Center			
1.1 Monitoring support	Network with officials	CEC; Gov't Relations; Development/ Foundation Office	Jan 1991
	Disseminate information	Ed Development; Grants Coor.	ongoing
	Expand data base	Grants Coor.	Sept 1990
	Annual plan	Grants Coor.	Sept 1990
1.2 Response support	Identify cadre of writers	Occ Ed; college R&D; Grants Coor.	Sept 1990
	Develop generic information/ data	Grants	Nov 1990 Coor.
	Establish Washington presence	Ed Development; Gov't Relations	May 1991
1.3 Grants Coordination Office	Establish office	Ed Development; Occ Ed	Sept 1990
2. Support by Colleges/Centers			
2.1 College/Center	Designate contact person	Presidents/ Provosts	Sept 1990
2.2 Monitoring support	Communicate within district	Designated person;	ongoing

2.3 Response support	Coordinate with other colleges	Designated person; Grants Coor.	ongoing
3. Financial Support			
3.1 Funding source	Dedicate some indirect costs	Vice Chancellor for Ed Development	July 1991
3.2 Allocation	Allocate funds as needed	BDEC	July 1991

Library Issues

by **Carmen Coracides, Chair - SCC**
Laurita Moore, Coordinator - District

BACKGROUND:

This was an area of discussion that came out of Technology Retreat '88. The information age has numerous implications for our libraries, and is changing the way we think about libraries and information.

CHARGE:

This task group will develop a plan for three major areas relating to libraries.

A. The development and dissemination of a list of architectural/instructional technological concerns that need to be considered when building or remodeling a library.

B. The continual evaluation and selection of research databases.

C. The continued dialog about the library's role on campus, not just the technological role, but the instructional role.

Group Participants

Karen Biglin, SCC
Jean Born, MCC
Georgia Dillard, PC
Jack Hannon, MCC
James Jacob, EMCCC
John Messer, SCC
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Irwin Noyes, SCC
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Ginny Stahl, SCC
Kaoru Sugiyama, MCC

Introduction

Information literacy is vital to the social, political, economic, and intellectual well-being of our nation.

Information literacy is vital to the social, political, economic and intellectual well-being of our nation.

Although centuries-old traditions deep-rooted in cultures give the individual a sense of stability and comfort, the same philosophy cannot and should not be applied to the world of education. For too many years there has been a barrier of isolation between what happens in the world of academics and the real world, where the ability to perform well in a job is crucial not only for the individual, but also for the United States, if it is to remain abreast of those nations who have stated implicitly their leadership roles in the world of politics, social structuring, economic standards, and most saliently, in the world of education.

Maricopa County Community College District provides educational and vocational services to over 90,000 students who are functioning members of today's society. Over 90% of all these students hold jobs while attending college. Although this figure is not as high among four year and graduate school students, the numbers holding jobs while attending school are increasing at a very fast pace. These jobs held by the students are not research internships posts, but rather jobs that provide services to society.

The provision of online access to databases, a primary mission of this Ocotillo group, is based on a national movement towards information literacy for all students. This movement which links students in academic and vocational programs to the real world is being done in a carefully planned manner in order to bring successfully these students across the bridge of information literacy.

The provision of online access to databases, a primary mission of this Ocotillo group, is based on a national movement towards information literacy for all students.

Keeping this at the forefront of all the discussions, the Library Issues Ocotillo Task Group addressed the three charges given by Vice Chancellor, Dr. de los Santos:

a) the development and dissemination of a list of architectural, instructional, and technological concerns that need to be considered when building or remodeling a library;
b) the continual evaluation and selection of research databases;
c) the continued dialog about the library's role on campus, not just the technological role, but the instructional role as well.

After considering the three initiatives, the Ocotillo Task Group established that the most crucial charge that needed immediate attention was the one pertaining to databases. The initial questions entertained and explored by the task group were very broad so as not to narrow things too quickly and eliminate an encompassing perspective. The following topics were raised as they related to the issue of databases:

I. What should they include?
  1) External, Online, Fee-based?
  2) CD ROM?
  3) Other Libraries, e.g. ASU (w/ catalog, indexes)?
  4) Other externally purchased canned databases (CHASE, OECD, etc.)?
  5) Links/Accessible on VAX?

II. Who would be the users?
  1) Who would be authorized to use the databases?
  2) End user needs to be mediated to save $ and improve accuracy?

III. How should the cost be viewed?
  1) Subsidized searching?
  2) User fees-Full/Fixed w/Minimum/Maximum?

IV. Other factors that will result as the databases are implemented:
  1) Increase of Interlibrary Loan (Bibliographic D.B.) will result in:
    a) big strain on staff
    b) increased frustration as more obscure references are identified
    c) increased instruction of one-on-one and groups for faculty and students
  2) More terminals needed:
    a) in library
    b) in common student accessible areas
  3) More printers needed for students

Although online databases have been around for well over 20 years, generally they have not been available to our students due to economic and technological limitations. Recent developments in the information industry and technology made it possible for MCCCD to purchase online databases and provide unlimited access to our students via our district-wide Ethernet. Faculty and students will have access from their offices, homes, and libraries, 24 hours a day.

District librarians have spent approximately two years going through the group process necessary to evaluate and select the best database available for our learning environment. As the discussion on databases began, there was the imminence of the inevitable purchase of a general database that would be available to the general student population and faculty. It would be delivered over the VAX network. A prototype base was created so the faculty could try it. This was done after directions on how to access it and use it were sent over A1 to all MCCCD users in Fall '89. The response to this sample database was positive, and above all, there was a sense of discovery for many who did not know that this learning tool to bridge the gap of information literacy was possible. The English, Social Sciences, and Allied Health faculty were very receptive and anxious about obtaining an actual general database. It should be noted that a general database is of great importance to those areas where there are several hundred sections of one class (e.g. English 102) and which at any particular point may have 60, 80, 100 students simultaneously needing to access that database. An example of the increase of this tool can be SCC's plan, described in its handbook for all ENG 101-102 students, which in use requires use of databases and online as part of meeting the English competencies. This limits the type of delivery that can be used and requires, by its nature, the purchase of a database, loading it on disc drives, and making it available over the VAX network.

District librarians have spent approximately two years going through the group process necessary to evaluate and select the best database available for our learning environment.

The English, Social Sciences, and Allied Health faculty were very receptive and anxious about obtaining an actual general database.

This process of long and deliberate consideration culminated in the selection of the Magazine Index from the Information Access Corporation. The Magazine Index covers a broad range of subjects and approximately 400 popular journals, most of which are available in our District libraries.

The networking of CD-Roms for some of the more specialized databases might be a solution for which we do not need as many simultaneous users—perhaps one and eventually up to eight users. Individual libraries will be purchasing some specialized databases. However, those will only be available at that particular college, and then only at the library when it is open. This matter in turn brought up the issue of accessibility to databases by faculty and students from their homes. Another issue raised was that of the colleges needing to provide dial-up abilities to support their students. This issue will require funds. The technology infrastructure is there but the colleges will need to make that decision to provide the dial-in access and include it in the budget. In most cases, the faculty already have this access.

Ocotillo, in its planning and analysis for the "library of the future," determined that there will be a blurring of boundaries between the library and other elements in the learning environment such as classroom faculty, computer labs, learning assistance centers, etc. There is a need for a much greater partnership between librarians and other classroom faculty as we move into the future. This year, the establishment of a subcommittee, Library Users Group, made up primarily of classroom faculty, has provided the first formal forum for the faculty to add to the group process associated with the MCCCD information literacy movement. From their very first meeting, the members of this subcommittee have been a vital source of information about and support for the new learning tools.

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Input from Library Users Group

The discussion was centered around two issues:

1. The training of faculty in the use of the Magazine Index.
2. Future concerns of the committee.

On the first point, it was decided that the best approach would be to disseminate this information through the Staff Development Coordinators at each college. A collaborative presentation by librarians, faculty, and staff could be made to the Coordinators at their district meeting outlining the committee's goals and suggestions. The committee feels that any presentation to the faculty by this collaborative group should touch upon the following areas:

1. Database availability, both on campus and at the district level
2. How to access databases
3. Practical suggestions for classroom usage of databases

A script incorporating these components could be worked out and supplied to the Coordinators at the time of the collaborative presentation.

As far as future committee goals and concerns, several were identified through general discussion:

1. The committee could serve as a valuable resource, providing feedback from faculty and students on issues related to library usage.
2. The committee expressed concern over the students' ability to

access information from the computerized systems, as well as their inability to save the information once it is retrieved. This discussion touched on areas such as the best way for students to save info (capturing to disc and/or printout), funding required to support access (workstation, paper, ribbons, etc.) and making dial up access from a home modem a reality for all students.

3. The committee also felt that some work needed to be done in the area of acquiring the equipment needed to support bringing technology such as computerized databases into the classroom.

MCCCD is currently in the process of acquiring and loading MAGS (Magazine Index). It is but the first of many information/learning tools to come. Librarians and faculty will continue to work together to analyze, select, and acquire the best databases, learning tools, and delivery methods for our learning environment.

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Files Storage and Retrieval Database

The Ocotillo subcommittee on the storing of files supporting faculty and staff activities has made a list of questions which we feel must be addressed before a decision is reached on this issue. The list is as follows:

1. Who is going to use it?
2. Exactly what do they need?
3. What is the estimated size of the database?
4. How much information is needed in each citation -- full text, abstract, or citation only?
5. Can the text or abstract be scanned in wherever possible?
6. What are the copyright implications? Will publishers allow us to keep copies of articles in the database?
7. What would the size of the database be? Permission from Ron Bleed or whomever to use that much storage, if we use the VAX? Or what size hard disk is needed if we use networked MACs?
8. Access to original document if only citation or abstract entered in database? Who provides; where kept; copyright issues?
9. What software will be used? Does it have Boolean search capabilities?
10. If various different individuals are inputting and writing their own abstracts and creating their own lists of descriptors, how do we maintain quality control?
11. How much will it cost to create and maintain this database, and is the benefit worth the cost?

The chairpersons of the Standards and Ergonomics Ocotillo Groups were contacted to see how much material they have gathered that they may want to store in a database. These groups also have some information (about a shopping bag each) that they have collected during the course of their research.

There is a group investigating the keying of important articles.

The technology to scan articles with graphics into a database will probably be available to us within the next two years. In light of this, it is recommended that the committee wait until this technology becomes available in order to "scan" articles into a database. At this time, the prospect of keying in full text of articles is probably unrealistic due to staff/time constraints. The actual physical storage of these materials will pose problems (who has room for them?) that the computer storage idea would solve.

Architectural Issues

MCCCD is embarking on a major capital planning process. This process is described as weaving a beautiful tapestry where different threads are eventually combined to form an integrated work of art. The architectural planning for the library of the future involves three main threads: 1) this Ocotillo Library Issue committee; 2) Library Directors (LARADO); and, 3) Estrella Community College Center. These groups, while having somewhat different focuses, are ultimately intertwined and have overlapping membership.

The "blurring of boundaries," extensive integration and interdisciplinary collaboration, have been the major themes for the library of the future. This integration involves three major components: 1) electronic; 2) organizational; and, 3) physical. The first two of these would heavily influence the physical architecture.

MCCCD has built many spans of the bridge linking the student in his/her college surroundings to the world of information literacy in which he/she must function effectively. MCCCD will continue to make great strides laying the electronic foundation for the library of the future. Thanks to Ethernet and the library automation system, students and faculty no longer need to go to the library physically in order to use it. Previously existing physical boundaries delineating individual college libraries are starting to blur. There's heavy interlibrary lending and interaction among the libraries, giving the students much better access to the resources and information from all colleges. This electronic integration will continue as we streamline interfaces between systems and locations, develop friendlier front ends, and increase services and capabilities.

The "blurring of boundaries," extensive integration and interdisciplinary collaboration, have been the major themes for the library of the future.

The organizational architecture and integration are influenced by the information literacy movement, the library across the curriculum movement, and the team teaching and collaborative learning movements. Classroom faculty are becoming more involved in library issues and their team relationship with librarians and classroom faculty from other disciplines will continue to increase and develop. MCCCD already has started some organizational integration by combining computing, telecommunications, and library technology under one Vice-chancellor. Estrella Mountain Center has taken the same approach by combining the same disciplines under one assistant provost. Other MCCCD colleges may follow suit.

The organizational architecture and integration are influenced by the information literacy movement, the library across the curriculum movement and the team teaching and collaborative learning movements.

Thus, the physical architecture must create an environment which will allow and encourage the maximum amount of interaction and collaboration among diverse groups. Physical departments will yield to common interdisciplinary learning places centered around the student.

Each MCCCD college represents a different stage in the evolution towards the learning place of the future and the different needs of the community which it serves. This learning place is analogous to the kaleidoscope. It has many elements which are part of an integral whole, but it is a constantly changing picture. The architecture must allow for this changing picture, for integration among the elements of learning, and for accomodating an unknown future, with as much flexibility as possible. As it crosses the bridge to information literacy, each college will have its own changing model of the kaleidoscope.

The architecture must allow for this changing picture, for integration among the elements of learning, and for accomodating an unknown future, with as much flexibility as possible.

Soon, the three planning groups will add to our vision of the future the element of the current learning theory and activated/accelerated learning. Recent research has proven that the physical environment heavily influences the amount and speed of learning. We will learn what we need to do to our future learning environment to provide the best learning spaces for our students.

Although the Ocotillo Library Issues Task Group has addressed and provided leadership in the solutions of the three initiatives as charged by Vice-chancellor de los Santos, the two subcommittee groups, the Library Users Group and the Architectural Materials Database group will continue to evolve and to generate the ongoing dialog between instruction and technology to better serve our students.

Non-Traditional Instructional Issues

by **Betty Field, Chair - PVCC**
Naomi Story, Coordinator - District

BACKGROUND:

This group is the direct response to a recommendation made by last year's "Where are we going and how do we get there?" group. (See the 1989 Interim Report, pp. 76, 80)

CHARGE:

Many academic issues are raised by technological solutions in instruction. Open/entry open/exit courses conflict with the semester-end reporting. What should be the qualifications or the loading credit for the site coordinator for a satellite or microwave-delivered course? This task group will develop a plan to implement paperless requisition and other forms while maintaining security, audit trails, and compliance with external regulations.

Group Participants
Mary Alcon, PC
Ann Barrett, MCC
Diana Dias, GCC
Joe LeCluyse, PVCC
John Messer, SCC
Anna Solley, EMCCC
Jean Staten, GCC

Introduction

At the Fall, 1989, meeting of Ocotillo one of the subgroups introduced was the Task Group on Non-traditional Instructional Issues. This group was charged with the task of "planning for and implementing specific recommendations related to non-traditional delivery." This year end report of the Non-traditional Instructional Issues Group is a plan for implementing solutions to some of the issues raised by non-traditional instruction.

We spent a major part of this 1989-90 school year gathering information and listening to the people involved. We held fact finding meetings, we interviewed people responsible for programs at their colleges, we sent out draft reports and asked for reactions, we called on individuals to respond to specific questions, and we held more meetings. We believe that every college was invited to join in our deliberations and we were appreciative of the openness and generosity of all involved. We were also enthusiastic about the energetic exchanges of information that occurred among the participants in our meetings. One meeting of OE/OE people resulted in a tremendous exchange among those present. We must have more meetings to continue this dialogue.

We were also enthusiastic about the energetic exchanges of information that occurred among the participants in our meetings.

Another milestone in the year occurred when we held a meeting with the Admission and Records Directors. The exchange of information was valuable to this Task Force but perhaps it was even more valuable to others who participated. All left with new information to use in facilitating non-traditional instruction.

We made a basic assumption about our task for this year. We assumed that we were dealing with non-traditional delivery that was supported by technology and our fact finding and report focuses on high technology and instruction. We remind the readers of this report that non-traditional instruction can successfully occur without the use of high technology.

Finally, the dialogues and exchanges of information that occurred as the result of this Task Group's work must continue. There needs to be more sharing within a college and between colleges.

the dialogues and exchanges of information that occurred as the result of this Task Group's work must continue.

Among the wide range of issues related to non-traditional instruction, we chose to focus on two:

1. The Shared class because it is new to our system and thus it is timely to deal with definitions, procedures, and processes.

2. Open Entry/Open Exit courses because this is a continuation of the 1988-89 Ocotillo group "Where are we going and how do we get there?".

We started with the 1988-89 Ocotillo Interim Report. OE/OE dialogue is one of the most urgent needs of the District at this time.

This report will discuss issues related to both of these topics and then list recommendations for implementing solutions. These recommendations can be translated into an ACTION PLAN.

1. Shared Class Discussion

A study of the shared classes concept is appropriate because it is a new delivery system for the MCCCD. The study is also appropriate because the MCCCD has spent the last year demonstrating this process between four colleges throughout the district. As a result of this demonstration project, we have not only theoretical data to discuss but practical issues that arose during the demonstration.

Statement of Problem

The problem, if it can be called such, is to develop and implement a shared class concept across the district that takes into consideration the varied needs and wants of each college. Specific areas of concern are:

1. clear and concise communication between students and institutions in regard to enrollment and related processes
2. support for the class at the non-originating site and support for adaption of the class content to non-traditional delivery
3. faculty issues including selection of faculty, and fair and appropriate reimbursement for faculty
4. scheduling issues such as selecting, canceling, and promoting classes and
5. technological compatibility.

In some areas, the activities of the past year have raised more questions than answers as would be expected at this stage in any new venture. It is the objective of this report to present the current concerns and make recommendations based on information collected from discussions and experiences that have occurred through out the process of the Phase II Video Demonstration Project both from active participants and from outside observers and resources. We have, of course, used other, existing non-traditional delivery experiences as resources and templates where applicable. One point that should be kept in mind is that we are not creating new classes, we are merely offering an alternative delivery system to existing classes.

Although we will deal with procedures, definitions, technology, and design issues, the primary focus of our research is to provide quality, accessible educational opportunities for students attending MCCCD.

Definitions

Although the definitions as applicable to the MCCCD are still evolving, for the purpose of the paper the following definitions will be used:

Shared class:	A class that is taught by an instructor at one campus and transmitted via the microwave system to another group of students at another campus.
Originating Instructor:	An instructor who meets the RFP requirements to teach a specific course and is teaching from the originating college. The instructor of record.

Facilitator:	An individual who is present in the classroom at the receive site/s to assist students in any way necessary to achieve the educational objectives of the class. This person may or may not be an instructor depending on the needs of the class.

Communication Between Students and Institutions

Issues:

1. Development of clear and concise communication between students and institutions in regard to enrollment. Accurate processing and delivery of grades are essential for successful shared classes.
2. Orientation of the students to create realistic expectations related to shared classroom delivery experience.

Recommendation:

Action Item: 1. Enrollment should occur at the institution where the student will take the class. A section number should be issued at each site which is specific to that site. The class should be listed in the schedule with an asterisk or other notation to indicate that this is a shared class and a list of the other sites where the class will be taught. A definition of shared class should appear in the schedule. Rosters for shared classes should be sent to the originating instructor. It will be the originating instructor's responsibility to process the grades according to the policies and procedures of the other colleges involved in order for the students to receive their grades from the college where they attended the class.

Office hours should be consistent with the policy for the type of class being taught. Many non-traditional classes use the telephone during office hours to meet with students. This process would be applicable to the shared class situation. In addition, the student also has the option of addressing questions to the facilitator during and after class. Those questions regarding content will be referred to the originating instructor unless the facilitator also serves in a content role.

Guidelines as to the process for testing need to be established. In class tests will be administered, monitored, and sent to the originating instructor by the facilitator. Make-up tests may be offered through the campus testing center or similar office. A review of cur -

rent OE/OE procedures may provide guidelines in establishing a testing policy, especially for missed tests.

Responsible Agents: Appropriate Dean(s), A & R Directors, Testing Center Directors

Timeline: Completed by September 30, 1990.

Action Item: 2. A student information sheet needs to be developed to describe the concept of the shared class and the microwave system. This sheet should be mailed to all students who enroll in a shared class. The instructor should also be prepared the first day of class to spend time orienting the students to the use of the microphones and explaining how grades, papers etc. will be processed for his/her class in much the same way an instructor handles orientation to any class.

Responsible Agents: Campus Representative, Phase II Committee, Center for Learning and Instruction (CLI).

Timeline: Completed by September 30, 1990

Support Services

Issue: Assurance of adequate support services at all sites.

Recommendation:

Action Item: A recognition and awareness of the need for comprehensive support for shared classes needs to be initiated by the administration at all campuses.

Budget planning should include replacement of equipment.

Textbooks need to be available at all bookstores. Library support needs to be consistent. The originating instructor needs to assume these two responsibilities as s/he would for any other class.

Counseling and advising need to be informed of shared classes and advised on how best to counsel students

Recommendation: Media support is required. Depending on the type of equipment and the staffing decisions of each college, technical support will be required to operate the origination site equipment and receive site equipment. Equipment maintenance and repair support is also required. Budget planning should include replacement of equipment.

Responsible Agents: Appropriate Dean(s), Originating Instructor, Media Center Directors, Advisement/Counseling Center Directors

Timeline: August 15, 1990

Issue: Although classes taught over the microwave system will be existing classes, it should be recognized that some adaptation of course material and presentation style will be needed to effectively use the television medium. Thus, support for instructional design and instructor training will be required.

support for instructional design and instructor training will be required.

Recommendation:

Action Item: Instructional design support will be required. The purpose of review and modification of the instructional design is to encourage the instructor to use all of the learning and teaching styles. Depending on the originating instructor's background, it may also be necessary to train the instructor to adapt his/her presentation style in order to use the medium most effectively.

Graphic support will be required to design and produce graphics as required.

Responsible Agents: Appropriate Dean(s), CLI, Media Center Directors, Originating Instructors

Timeline: August 1990 for Fall 1990 classes, after that on-going.

Faculty Related Issues

Issue: No criteria has been established to assist in the selection of faculty.

Recommendation:

Action Item: Develop guidelines for selection of faculty to teach the shared classes. Enthusiasm for the use of alternative delivery, nontraditional education should be a requirement.

Responsible Agents: Appropriate Dean(s), Department Chairpersons

Timeline: Dec. 15, 1990

Issue: The need for training faculty the first time they teach a shared class using the microwave system is recognized. The exact procedure to accomplish this training has not been established. Guidelines for faculty reimbursement for training and development have also not been established.

Recommendation:

Action Item: Faculty will require an orientation to the system. The orientation should include: technical demonstration and explanation, short history and future projection of the project, demonstration of appropriate teaching techniques, and a hands-on opportunity to use the system in a pre-produced training lesson. The orientation should not take more that four hours. Each college should provide the training for their faculty since much of this will be site specific. CLI or one college could produce the hands-on preproduced training lesson since it will be generic and replicable by each college.

Additional training to alter presentation styles and modify the class content as mentioned in the section on adaptation of course material is considered an integral part of preparing a class for first-time use on the system. A suggested preparation cost for faculty who have never used the system before including training and adapting their lesson plans to a new medium, is one credit hour. If training and course design/adaptation are separate functions, payment should be divided appropriately.

Responsible Agents: Appropriate Dean(s), Department Chairs, Media Center Directors, CLI, Originating Instructor

Timeline: August 1990, and ongoing for each new class.

Scheduling Classes

Issue: There are no guidelines for the process of selection, cancelation or promotion of shared classes.

Recommendation:

Action Item: 1. The selection of classes to be offered should result from joint college participation. Items to consider are the following: low enrollment courses that usually cancel on several campuses but the combined enrollment would allow the class to go; (the originating site may or may not have low enrollment); one of a kind classes that are offered only at one campus; master teacher whose special skills would enhance other campuses offerings; and, upper level classes that are difficult to offer on a regular basis because of low demand. The guidelines for selecting faculty mentioned earlier in this document should also be considered in the process of selecting classes.

Responsible Agents: Appropriate Dean(s), Department Chairs.

Timeline: Guidelines established by December 15, 1990, after that on-going each semester.

Action Item: 2. Guidelines should be established to assist in the decision to cancel a class. Recognizing that this is a new project, allowance may need to be made until this form of delivery is established. The cost of a class in comparison to the enrollment is definitely a factor in class cancellation. FTSE generated will accrue to the site at which the student is enrolled. It is recommended that the cost of the faculty salary be prorated according to the enrollment at each participating site and paid to the originating site. Each site will absorb the cost of overhead, support services and a facilitator. Since the cost is prorated among the participating colleges, cancellation of the class should be reached by mutual agreement.

The colleges need to continue to address the need for technological compatibility so that the maximum benefit can be gained from equipment purchased.

Responsible Agents: Appropriate Dean(s), Department Chairs

Timeline: Guidelines established by December 15, 1990.

Action Item: 3. Classes should be promoted through the class schedule. Each college would need to evaluate additional promotional effort based on individual class offerings. An exception to this may need to be considered until the shared class system is established.

Responsible Agents: Appropriate Dean(s), Department Chairs

Technical/Management Concerns

Issue: The colleges need to continue to address the need for technological compatibility so that the maximum benefit can be gained from equipment purchased.

Recommendation:

Action Item: A centralized group combined of technicians, instructional designers, faculty, and administrators need to continue to provide liaison between the campuses. The Telecommunications Users Group (TUG) is the ideal group to serve this liaison function.

Responsible Agents: Appropriate Dean(s), TUG.

Timeline: June 1990.

Issue: One of the primary concerns that has not been addressed is the ongoing operational management of the shared classes. Who will be the responsible entity on each campus to provide student and faculty support by acting as a problem solver addressing all of the myriad of issues that will need attention to make sure these classes operate smoothly? This decision has not been made.

Recommendation:

Action Item: Further study is needed before a recommendation can be made. It is suggested that this become a study item for the groups involved with the shared class during 1990-91.

It is too early for procedures to be set in stone

Responsible Agents: Appropriate Deans, TUG, Media Center Directors, Department Chairs, Originating Instructors.

Timeline: June 1991

These recommendations are just that, recommendations, a starting place from which to evolve. It is too early for procedures to be set in stone-- hence the word guidelines rather than procedures. It is also recognized that the current position of this nontraditional, alternative delivery system, the shared class, has resulted from the thoughts and actions of many creative people. It is hoped that many more creative people will be able to add their input to the shared class project as it progresses into the role of "just another" option for MCCCD students.

2. Open Entry/Open Exit (OE/OE) Discussion

Statement of the Problem

Restraints of the "system":

Almost all discussions about OE/OE classes and their management can be reduced to the fact that non-traditional instruction in the Maricopa District does not easily accommodate itself to our present intrastructure. Those innovative persons who have been the pioneers of OE/OE courses have met barriers at every turning point. The constraints of dealing with faculty and staff loading, pay, responsibilities, record management, etc. that are bound by the traditional semester—the 16 week unit of time—have been endless. Simply stated, the traditional semester setting and the restrictions it has placed on processes and policies are barriers to non-traditional instruction.

Simply stated, the traditional semester setting and the restrictions it has placed on processes and policies are barriers to non-traditional instruction.

There is not much latitude for non-traditional, innovative delivery because of the restraints of the system. Furthermore, our fact finding groups found that there is a perception that there are risks associated with becoming involved with non-traditional delivery. There are perceived risks to faculty, administrators, and students.

Lack of Definitions

There is a complete lack of definitions for those concepts needed for OE/OE courses. In fact, there is not even a district definition of OE/OE.

Inconsistencies

Because there are few procedures and guidelines for the establishment of OE/OE courses, each college or even each department has proceeded independently. The resulting inconsistencies are overwhelming and are a cause for concern. There are inconsistencies in faculty loading, staff job descriptions, course competencies, organizational structures, and on and on. We are very concerned about these inconsistencies. First, we believe that these inconsistencies will impact our students, what they encounter within a college and what they encounter between colleges. Second, we believe that these inconsistencies are impacting the treatment of faculty and staff and affecting OE/OE programs at the colleges.

Lack of Sharing

The competitive spirit between departments within a college and between colleges, the fierce pride in college autonomy, and the heavy work loads of the non-traditional faculty and staff have led to a lack of sharing. Yet our fact finding committees received enthusiastic support and openness. There is a wealth of expertise, prior experiences, and solution to problems. It must be shared.

The competitive spirit between departments within a college and between colleges, the fierce pride in college autonomy, and the heavy work loads of the non-traditional faculty and staff have lead to a lack of sharing.

This Report

Our report will not recommend that there be an absolute, inflexible set of "rules" for OE/OE courses. Rather, we will recommend some processes to establish guidelines and assistance so that each college can achieve the highest level of excellence desired. The purpose of these recommendations is to remove as many barriers as possible from the delivery of non-traditional instruction.

This report will focus on the following issues:

1) Definition
2) Processes and Procedures
3) Curriculum
4) Grading
5) Records Management
6) Human Resources

Definition

The Arizona State Board of Community Colleges has defined Open Entry/Open Exit courses:

> "Open-entry, open-exit courses are courses which may commence at any time during the fiscal year and are characterized by students entering and completing at a variety of times. They feature individualized instruction and are laboratory-intensive and competency-based."

Issue: 1. There is no Maricopa Community College definition of OE/OE courses. This task force recommends the existing State Board definition for both vocational and non-vocational courses.

Recommendation:

Responsible Agents: The Vice Chancellor of Educational Development, the College Presidents and Deans, and faculty and staff representatives from existing OE/OE courses.

Action Item: Recommend a definition of OE/OE courses (both vocational and non-vocational) for adoption by the Maricopa Community College Board and proceed with that adoption.

Timeline: Adopted by December 15, 1990.

Our fact finding group found that there is no defined process for starting an OE/OE course.

Processes and Procedures

Issue: There is no District procedural guide for the establishment of OE/OE courses. Our fact finding group found that there is no defined process for starting an OE/OE course.

Recommendation:

Responsible Agents: The Vice Chancellor for Educational Development and appropriate college representatives.

Action Item: Write district-wide procedures for establishing OE/OE courses.

Timeline: Completed and distributed by December 15, 1990.

Curriculum

Action Item:

1. The OE/OE courses in the course bank need to be evaluated. It is possible that some courses are out of date and should be eliminated. It is possible that some courses can be redesigned.
2. The OE/OE courses in the course bank need to be evaluated and updated in terms of the descriptions of the competencies.
3. There are some inconsistencies among instructors and among colleges in following the minimum competencies in some courses.

Recommendation:

Responsible Agents: The Vice Chancellor of Educational Development, appropriate Deans, the District Curriculum Committee, the District Instructional Councils.

Action Item: 1) Review and update the existing list of OE/OE courses in the course bank. Review and update the competencies of the OE/OE courses.

Timeline: Activity completed by December 15, 1990.

Grading

Issues:

1. The P/Z grade.

   Here there are three concerns:

   a) Within the Maricopa Community Colleges there is considerable inconsistency with the use of the P/Z grade.
   b) We have a responsibility to communicate to our students the different interpretations that the universities are giving to the P/Z grade.
   c) There is inconsistency in the way the P/Z grade is interpreted by the Financial Aids

Officers and Directors of Veteran's programs within the Maricopa District. One interpretation is that the "P" grade is acceptable but the "Z" grade is not acceptable. The Z does not equate to a failing grade such as an "F" which is acceptable. The Z means no credit and therefore is not acceptable.

2. Interpretation of Data.

   The issue is how the "in progress" grade is interpreted when statistical programs are run by the college or the district for data about completion rates and/or evaluation of programs.

3. Enrollment Agreements.

   The issue is the legality of Enrollment Agreements for OE/OE classes. Glendale Community College appears to have a successful model of the use of "contracts". This model needs to be studied, sanctioned by the district, and then shared with other colleges.

Recommendations:

Recommendation 1.

Responsible Agents: The Vice Chancellor of Educational Development and the Catalog Common Pages Committee.

Action Item: Clarify the grading policies for P/Z grades as they pertain to OE/OE classes. Include statements in the catalog common pages so that students will understand what happens to the P/Z grade at the universities.

Timeline: Completed by December 15, 1990

Recommendation 2.

Responsible Agents: The Vice Chancellor of Educational Development.

Action Item: Clarify with the Financial Aids Officers and the Directors of Veteran's programs the interpretation of the P/Z grade. Write and distribute to students, faculty, and administrators the district wide agreement about this P/Z grade interpretation.

Timeline: Completed by December 15, 1990.

Recommendation 3.

Responsible Agents: The Vice Chancellor of Educational Development, appropriate Deans, A&R Directors, and OE/OE representatives.

Action Item: Investigate and clarify the interpretations of the "I" grade for reporting and evaluation.

Timeline: Completed by December 15, 1990.

Recommendation 4.

Responsible Agents: The Vice Chancellor of Educational Development, College Presidents, appropriate Deans, and OE/OE representatives.

Action Item: Work with legal consultants to clarify the legal status of "enrollment agreements" and obtain the necessary District sanction so that colleges can use them.

Timeline: Completed by December 15, 1990.

Record Management

Issues:

There are at least these four issues:

1. OE/OE instruction does not "fit" into the semester system. Almost every aspect of record management from registration and the creation of class rosters to 45th day reporting to end of the semester reports is based on the traditional 16 week semester. There have been few accommodations to non-traditional schedules. In all cases these accommodations have been the result of a supportive and creative Admissions and Records Director.

2. OE/OE instruction does not "fit" with the existing SIS system. There is no need for the 45th day rosters to be issued to OE/OE instructors and it should be possible to program the system so that these rosters are not printed out. Can't we lessen the paperwork and confusion?

   There is a need to modify the way grades are printed out at the end of the semester; when some students are mailed the "I" grade they are confused. It should be a simple programming task to modify this.

   It should also be possible to modify the "posting cycle"—that is, the way grades are posted to the transcript. Our concern is that the grades be posted on the student's transcript in a timely manner.

   Overall, we need for the Information Technologies Services (ITS) programmers to work more closely with the A&R Directors and OE/OE people and to respond to their requests.

3. Record Keeping.
   Most classroom/lab record keeping is still being done with paper and pencil. There has been little assistance to classroom instructors and staff to use current technology.

4. Need for Guidelines.
   OE/OE course designers need guidelines to establish processes. It is possible that we need some district-wide policies. Here are two examples:

   a. Although the auditors allow 12 months for the completion of an OE/OE course by a student, sound educational practices tell us to limit this completion period. What is a "reasonable formula"? One successful program in the District allows 12 weeks for a 1 credit course, 15 weeks for 2 credits and 16 weeks for 3 credits in formulating enrollment agreements. (The ending dates can be extended in special cases.) Should this become a District policy? One issue is the need for consistency so that students are treated fairly and equitably within the college and among the colleges.

b. How many OE/OE classes that are in sequence can a student sign up for at the same time (i.e., the beginning of the semester)? One successful program in our District allows (highly recommends) only two, with justification aimed at supporting the success of the student. Should there be district policies or guidelines?

We must remember that a set of policies and guidelines for traditional courses has been developed over the years and that these "rules" are aimed at supporting the successful student. Do the new modes of delivery suggest the need for similar policies and guidelines?

We must remember that a set of policies and guidelines for traditional courses has been developed over the years and that these "rules" are aimed at supporting the successful student.

Recommendation 1:

Responsible Agents: Information Technologies Services

Action Item: Establish district programming support to work with both the inflexibility of the semester structure and the SIS system. ITS should work closely with the Admissions and Records Directors and representatives of the OE/OE faculty and staff to set priorities that can be responded to in a timely manner.

Timeline: Programming support on a continuous basis but resolve the 45th day roster print out and the "I" grade print out by October 15, 1990.

Recommendation 2:

Responsible Agents: College Presidents, College Computer Services Directors.

Action Item: Establish college computer services support and follow-up so that district written programs become operable at the college level.

Timeline: Programming support and training on a continuous basis.

Recommendation 3:

Responsible Agents: Information Technologies Services

Action Item: Continue the support for the development of the INFORM system (Instruction Network for Faculty On-line Record Management) and expand its capabilities as needed. Share this system district-wide.

Timeline: Pilot INFORM with at least two more (besides GCC) colleges Fall, 1990. Continue until every OE/OE program at least has the opportunity to use INFORM.

Human Resources

Introduction

The broad issues are the same that appear throughout this report:

1. non-traditional instruction is not fitting into the traditional setting,
2. there are inconsistencies within the college and between the colleges and
3. there are not appropriate definitions.

The issues are related to consistency and equity. While philosophical issues are related to differences in ideas about teaching and serving students and involve such questions as the number of students per instructor or the differences between instructors and lab technicians working with students, the basis for this discussion is equity and protection of both people and programs. The District can not continue OE/OE and non-traditional instruction without dealing with these issues and several of them are RFP issues.

Again, we are not taking the stand that there must be absolute consistency but instead that there must be guidelines to remove the barriers and the risks from those attempting non-traditional instruction.

We will first discuss the issues related to staff positions and then those related to faculty.

Staff Positions

Issues:

1. We have new emerging roles and responsibilities, an old set of job positions, and a system that has not made change. There is no match between what we need for OE/OE support positions and what exists in the job "bank." We need new positions, new descriptions of responsibilities, new job titles, and evaluation and regrading of current PSA Grade Levels.

   The following are examples of job levels that need to be introduced and/or reviewed and/or re-graded:

   Paraprofessional Content Specialist
   Lab Manager (OE/OE)
   Lab Technician(OE/OE)
   Lab Assistant (OE/OE)
   Personnel Manager/Coordinator

Does a certificated faculty member have to be "on the floor" at all times?

2. We need legal guidelines to understand the complexities of who must be present in OE/OE labs. Does a certificated faculty member have to be "on the floor" at all times? What are the legal ramifications when technology is being used to deliver instruction? Who are the responsible agents? Can a lab technician be responsible for grading and testing?

Can a lab technician be responsible for grading and testing?

Recommendations:

Recommendation 1:

Responsible Agents: The Vice Chancellor for Human Resources, appropriate Deans, appropriate staff and faculty representatives from OE/OE courses.

Action Item: Examine the current "job bank" and existing positions, write new titles, descriptions, grades, and salaries, and have them approved by the Board.

Timeline: Completed by December 15, 1990

Recommendation 2:

Responsible Agents: The Vice Chancellor for Educational Development, the Vice Chancellor of Human Resources, the College Presidents, and representatives from OE/OE courses

Action Item: Formulate and discuss legal concerns about OE/OE labs. Distribute written legal guidelines.

Timeline: Completed by December 15, 1990

Non-traditional instruction has caused the emergence of new roles and responsibilities within a system that has not had the flexibility to define and protect the positions needed.

Faculty

Issues:

1. Non-traditional instruction has caused the emergence of new roles and responsibilities within a system that has not had the flexibility to define and protect the positions needed. Examples of emerging faculty roles are:

    Teacher of Record
    Lead Teacher
    Course Designer
    Course Coordinator
    Author (Courseware)
    Director of Instructional Technology and Design
    Director of the Innovation Center
    Coordinator of Instructional Computing

    This Task Force agreed that the Teacher of Record is the full time teacher whose name appears in the schedule, who is responsible for assigning grades, adopting textbooks, and writing the syllabus.

We believe that both individuals and programs must be protected and that there must be more clearly defined and open agreements about these positions.

2. The "loading" of these positions presented the greatest inconsistency we found in our fact finding work. We found inconsistencies within a college. We found inconsistencies between the colleges. We believe that both individuals and programs must be protected and that there must be more clearly defined and open

agreements about these positions. The colleges need some flexibility, there should be a formula based on number of students and perhaps another based on number of hours. But there must be some baseline.

3. There are no guidelines for loading and/or compensation for other non-traditional roles such as course development, authoring, and course coordination.

There are no guidelines for loading and/or compensation for other non-traditional roles such as course development, authoring, and course coordination.

4. Another issue is how these non-traditional faculty roles fit into a traditional system. Here are some questions:

   a. To whom do non-traditional faculty report? To their department chairs? To the appropriate Dean? To the college President?

   b. How are these faculty evaluated? Neither the existing faculty evaluation process and forms nor the service faculty process and forms are appropriate.

      How do you evaluate innovative, emerging roles?
      Who should do this evaluation?
      Do we need to establish another process?

   c. What is the faculty members relationship to his/her department? We were hired as content experts and we were hired by a specific department. This relationship is being threatened. Are we a member of the department? Is this causing a need to hire another person within the department? Are we listed as being on release time from that department? These people are becoming "Men/Women without a country" and they are experiencing more risk than they should because they are involved in non-traditional instruction.

5. There must be timely and non-punitive compensation for non-traditional instruction. The reporting system for compensation must be more streamline and consistent.

Recommendations:

Recommendation 1:

Responsible Agents: The Vice Chancellor of Human Resources, the Faculty Association, appropriate Deans, and faculty representatives from Non-Traditional Instruction.

Action Item: Open and resolve the RFP issues, including new faculty positions, loading, evaluation, and faculty/department/division status.

Timeline: Start deliberations now to have the foundation for the next negotiation period.

Recommendation 2:

Responsible Agents:: **The Vice Chancellor of Business Affairs, The Vice Chancellor of Human Resources, Faculty Association, and faculty representatives.**

Action Item: **Examine the pay schedules and the requirements for timely pay and improve the flexibility for non-traditional instructors.**

Timeline: Completed by December 15, 1990

Summary

From the many facets of non-traditional instruction we have focused on the Shared Class and Open Entry/Open Exit courses. The central issues all revolve around these four concepts:

1. the restraints of the traditional "system,"
2. the lack of definitions and guidelines,
3. the inconsistencies within and between colleges,
4. the lack of sharing.

We have gathered information, described issues, and made recommendations in this report. We experienced an openness and candidness that was supportive of this process. As the fact finding and recommending Task Group this year, it is our perception that people at all levels, staff, faculty, and administration, are ready to deal with the issues. Most people acknowledged the needs and expressed the concern that we "move on" and resolve the issues. Some recommendations will be easy to accomplish. Others will take dialogue, patience, and compromise. In all cases, there is little confusion about the end product. That end product is the delivery of instruction to our students.

it is our perception that people at all levels, staff, faculty, and administration, are ready to deal with the issues.

Some recommendations will be easy to accomplish. Others will take dialogue, patience, and compromise.

Appendix A

MCCCD - LOADING: OE/OE Classes

Information gathered, Fall, 1989.

Loading:
This area is one that has the most variances.

Glendale:	Forty (40) Students is considered a class. Divide 40 into total OE/OE headcount to determine how many load hours are available. (Historical data is used) Formula used for visiting staff load: 19.0476 hours of work will earn 1 credit load hour of pay at 0.7 loading.
Gateway:	Uses the same formula used for structured classes. The OE/OE teacher is loaded all 15 hours in the lab (an RFP position).
Chandler/Gilbert:	The teacher of record is loaded 1 clock hour per 1 load hour ratio. Regardless of how many students are enrolled in the OE classes, the loading is 15 credit hours (semester load). (RFP position). The adjunct faculty are hired to cover the other hours that the lab is open and they are loaded .7 for every 60 minutes (per week for a 16-week semester).
Rio Salado:	Uses several different formulas for determining faculty loading, for example: 1. One load hour for every 2 1/2 students for 6 hour credit practicum. 2. One part-time faculty is assigned and scheduled according to the load hours of the type of class being taught. A lead person is used with no loading differential. Part-timers are assigned to particular sections and paid accordingly (up to 9 in any semester). 3. Work assignments differ from lab to lab. One center uses 3 hours of lab/load hour. One uses a formula: Load x 16/19 = hours/week in lab.
Phoenix:	Uses every 20 students equal 1 load hour; if it is lecture it is 1.4 load hour.

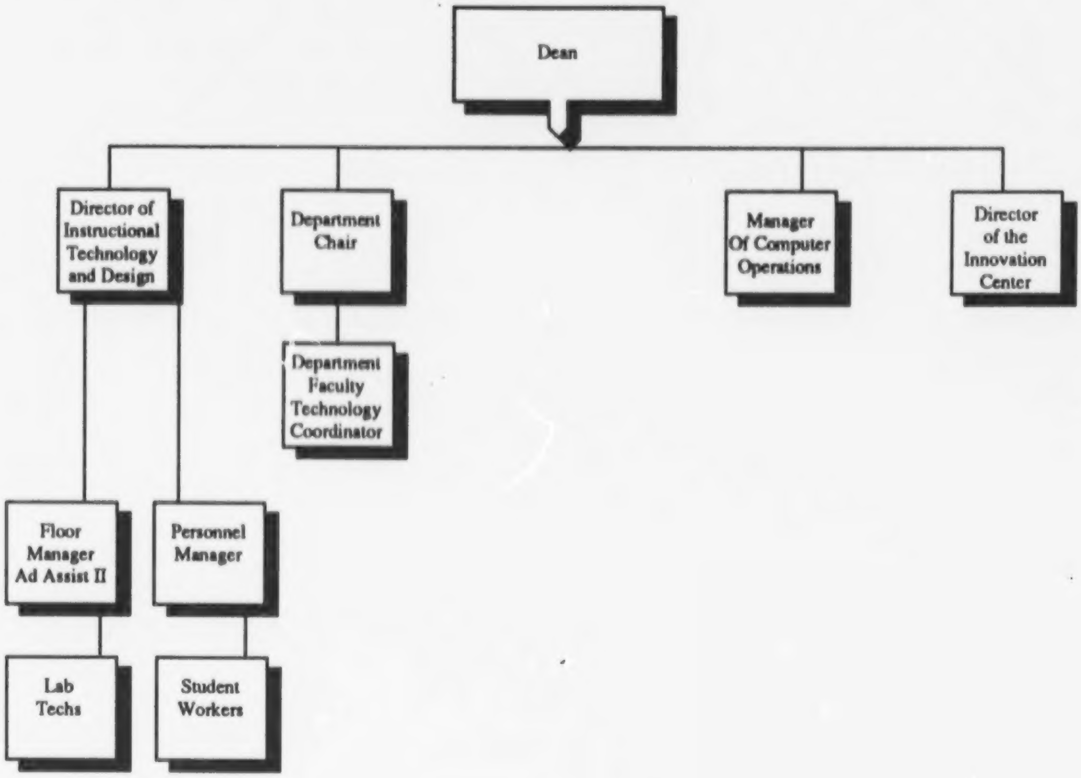
Mesa: Twenty (20) students are considered a class. Divide 20 into total number of students enrolled in that particular class to get the total number of sections multiplied by the class loading (e.e., OAS 101AA is 1.49 loading, BPC114AA is 1.7 loading) to find out how many load hours are available.

Full time instructors will use as many hours necessary from that figure to create their load. Then the remaining load hours are given to part-time faculty. Full time faculty are Teachers of Record.

Part-time faculty will get .7 per 50 minute period in the lab to make 1 load hour.

Appendix B

MCCCD - Large College: Department Organization


Dean
Director of Instructional Technology and Design
Department Chair
Manager Of Computer Operations
Director of the Innovation Center
Department Faculty Technology Coordinator
Floor Manager Ad Assist II
Personnel Manager
Lab Techs
Student Workers

MCCCD - Large College: College Organization

Coordinator of Instructional Computing

- Puts the OE/OE lab together.
- Gathers the equipment and sets up the configuration of the lab with help from the Director of Information Services.
- Establishes procedures and policies.
- Coordinates instructional activities in the lab.
- Works with the faculty (from several disciplines) initiating OE/OE classes.
- Promotes OE/OE classes and the use of the computer lab.
- Helps in the lab.

Lab Manager

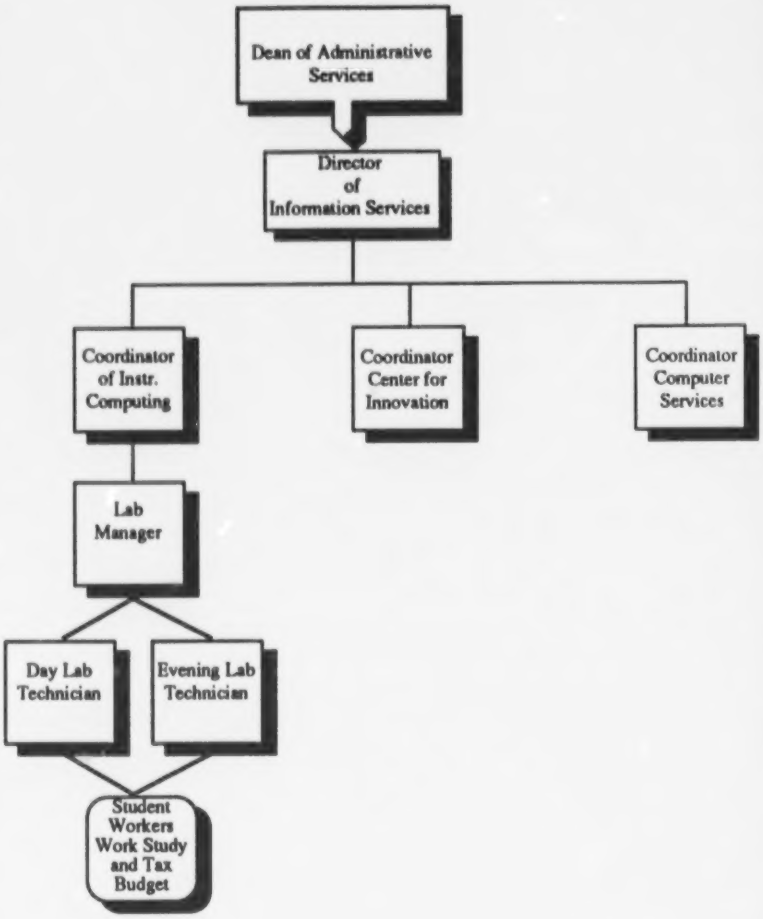
- Hires and schedules student workers, keeps track of time cards and records time.
- Gets software ready for instructors.
- Supervises lab technicians.
- Assists teachers with software problems.
- Assists in the lab.

Lab Technician

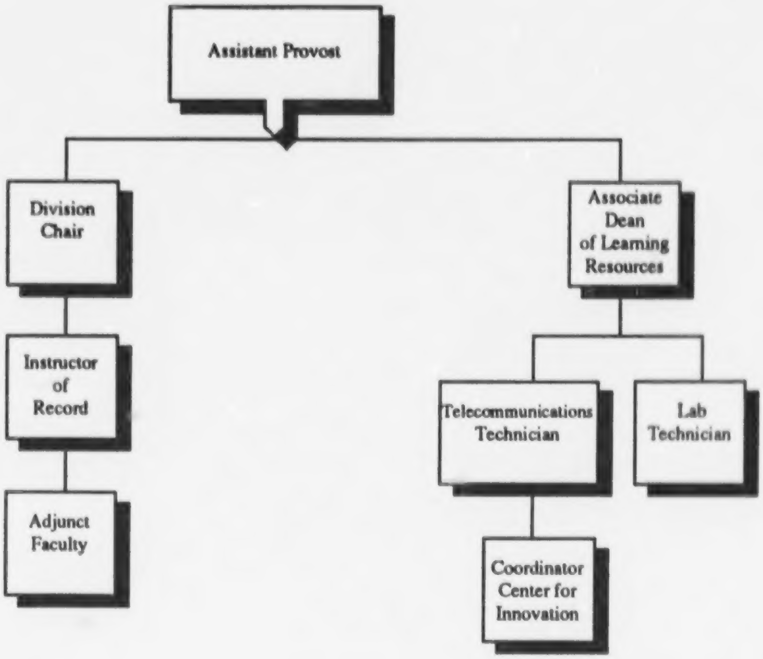
- Helps students with software and hardware problems in the lab.
- Supervises student workers during their shift.

Student Worker

- Logs students in and out.
- Checks out software.
- Assists students with software and hardware problems.
- Loads printer with paper.
- Cleans.
- Reformats disks that go bad.
- Grades.
- Files.


Dean of Administrative Services
Director of Information Services
Coordinator of Instr. Computing
Coordinator Center for Innovation
Coordinator Computer Services
Lab Manager
Day Lab Technician
Evening Lab Technician
Student Workers Work Study and Tax Budget

MCCCD Small College: Division Organization


Assistant Provost
Division Chair
Associate Dean of Learning Resources
Instructor of Record
Telecommunications Technician
Lab Technician
Adjunct Faculty
Coordinator Center for Innovation

Division Chair
- Approves all decisions about lab orientations, classes offered, final staffing hours, etc.
- Supervises and evaluates the Instructor of Record.

Instructor of Record
- Works in the lab.
- Answers student questions.
- Grades homework.
- Supervises the operation of the lab.
- Hires and supervises adjunct faculty.
- Reviews and chooses textbooks.
- Preparse course materials.
- Provides answer keys for courses.
- Answers advisement questions about OE/OE computer courses.
- Files student records and reports.
- Meets with students who have special needs.

Adjunct Faculty
- Answers student questions about OE/OE classes.
- Grades homework for OE/OE classes.
- Provides general supervision for students in the lab regardless of what course they're enrolled in.

Associate Dean of Learning Resources
- Responsible for the technical support provided to the instructional programs which use the Computer Lab
- Supervises the lab technicians and the Telecommunications Technician.

Telecommunications Technician
- Responsible for hardware and software support within the lab.
- Coordinates the training for the student workers.
- Assigns the student workers to special projects.

Lab Technicians
- Supervises student workers.
- Grades OE/OE homework.
- Assists students with questions and problems.
- Coordinates student workers.
- Monitors the circulation of software in the lab.
- Reports hardware and software problems to the Telecommunications Technician
- Reports instructional problems to the Instructor of Record.
- Does special projects related to the lab and computing on campus.

WRITTEN DISTRICT-WIDE PROCEDURES

Written District-wide Procedures should include (but not be limited to):

- The State and District definitions of OE/OE courses.
- The procedure for establishing OE/OE courses.
- The role of Instructional Councils.
- The role of Curriculum Committees.
- Legal issues.
- Records Management Guidelines and Information.
- Grading Guidelines.
- Enrollment Agreements.
- Organizational Hierarchy Examples.
- Loading Guidelines.
- Staffing Guidelines.

Standards

by **Manny Griego, Chair - GCC**
Jan Baltzer, Coordinator - District

BACKGROUND:

This group continues the work begun last year by the Planning for Information Technologies Facilities group.

CHARGE:

This task group will develop a plan for the dissemination and implementation of technology standards for MCCCD, which have been developed within the district and which are imposed from without. In addition this group will address the issue of compliance to standards vs. the experimentation that leads to new standards.

Group Participants

Lionel Diaz, DIST
Gilbert Gonzales, CGCCC
K.C. Hundere, DIST
James Jacob, EMCCC
Don Shehi, DIST
Bill Snyder, DIST
Jean Staten, GCC
David Waters, DIST
Chris Zagar, GCC

The Ocotillo Research/Action Committee on Technical Standards has developed a document for MCCCD entitled "Technology Standards and Guidelines for the Maricopa Community College District." The Standards Committee has also collected various books, articles, and vendor provided documents to be used as reference tools. Information Technologies Services will be responsible for housing all reference materials and making them available on a checkout basis to interested parties. All individuals receiving copies of "Technology Standards and Guidelines" will also receive a bibliography of available resource materials.

developed a document for MCCCD entitled "Technology Standards and Guidelines for the Maricopa Community College District."

Upon final review by the Standards Committee, the "Technology Standards and Guidelines" document was reproduced on 8 1/2" x 11" paper and drilled so that it can be easily inserted into a 3-ring binder. The document has been organized into four general areas:

- Introduction
- Standards
- Guidelines
- Appendices

Page footers have been included in the document to allow for sufficient room to include section name,page number, and revision level and date revised (e.g. Revision l/April 22, 1990). All revisions will be dated so that college and district office personnel can accurately track changes. Separate pagination for each section has been incorporated so that individual sections can be updated without having to reprint the entire document.

The MCCCD Information Technologies Services Department will be responsible for updating and revising the document.

A copy of the document, as well as copies of sections subsequently updated, will be distributed to the following individuals at each college/center:

- President,
- Computer Coordinator,
- Telecommunications Coordinator,
- Director, Instructional Media Center,
- Director, Buildings & Grounds, and
- Individuals specifically identified as having responsibility for new construction and/or remodeling projects.

Multiple copies of the document and of subsequently revised sections will be distributed to the Information Technologies Services, Planning, Purchasing, and Legal Departments departments at the District office. Copies of the entire document and subsequently updated sections will be provided, upon request, to the District Planning department for use by contractors and architectural firms.

TECHNOLOGY STANDARDS
AND
GUIDELINES
FOR THE
MARICOPA COMMUNITY COLLEGE DISTRICT

Ocotillo Research/Action Committee
on
Technical Standards

April 11, 1990

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INTRODUCTION

This document identifies technology standards and general guidelines which are to be observed in the remodeling and new construction design of information technologies facilities for the Maricopa Community College District (MCCD). The prime purpose of this document is to cite the areas for which standards have been developed, and to direct the reader to appropriate reference material for detailed information. Wherever standards do not exist, this document recommends guidelines which have proven to be successful in District construction/remodeling projects.

The following information is included in Appendices.

[ ] Appendix A: Pin outs for data adapters, punch block, and terminal servers.
[ ] Appendix B: Glossary of terms.
[ ] Appendix C: Specification checklist
[ ] Appendix D: Ocotillo Standards Committee Members (1989 -1990)

Because of the inherent nature of changing technologies, this document cannot be considered to be complete. What are presently considered to be standards will continue to evolve due to changing technologies. Areas where experimentation has been the mode for planning and application will eventually evolve into standard operations to be followed by ensuing construction projects. Once standard, those areas will also continue to evolve.

It should be noted that any changes, additions, and/or deletions to the computer/telecommunications systems in the District must be reported to District Network Support through Jan Baltzer or KC Hundere.

DISCLAIMER

Vendors are referenced in this document only to provide the reader with potential sources for information on specific devices and/or systems. No recommendations, explicitly or implicitly, are suggested. Prospective vendors who wish to be added to MCCD vendor lists, should contact the Director of Computing and Communications at the Maricopa Community College District Office.

STANDARDS AND RECOMMENDED GUIDELINES

The following areas are considered to be standards, and therefore should be adhered to in project planning and development.

[ ] Documentation and Labeling
[ ] Baseband/Ethernet Cabling
[ ] Twisted Pair for Duplex Voice/Data Jacks
[ ] Distribution System Requirements
[ ] Pin-outs/Connectors/Termination Devices
[ ] Coaxial-based Broadband

The following areas are recommended as guidelines to assist in project planning and development.

- [] T1/DS1 Microwave Network
- [] Relationship of Voice/Data/Video Communications to Electrical Environment
- [] Security Systems
- [] Entrance Facilities
- [] Outside Plant Conduits
- [] Conduits Within Buildings
- [] Engineering/Environmental Considerations

VOICE/DATA/VIDEO CABLING POLICY STATEMENT

Objective

Prior to the divestiture of AT&T and implementation of the District-wide Telecommunications Improvement Project, requirements for telephone cabling were accumulated by the individual colleges until sufficient quantities existed to request service from either Mountain Bell or AT&T. Requests for data wiring were made directly to Computer Repair Services and installations were completed as resources became available. The installation of data cabling throughout the District has required as many as three full time employees at one time.

MCCD now has total responsibility for voice, data, and video cabling. This includes responsibility for physically placing the cable and for maintaining both hard copy records, in the case of video cabling, and cable plant records for voice/data cabling cross connects. With this responsibility comes an opportunity to establish guidelines which will insure that future voice/data/video network expansion and cable plant integrity can be maintained.

In order to implement such guidelines, it is necessary for the Colleges and the District Office to jointly share the responsibility for planning, implementing, and funding future additions and changes to the cable plant. Without guidelines, and adherence to them, it will be only a matter of months before the current cable plant installations begin to look like the old cabling network that had been previously replaced. A return to undocumented or poorly installed cable plant would result in significantly additional expense when network expansion is deemed necessary.

Policy Statement
In order to improve the decision making process regarding additions and changes to the voice/data/video cable plant, it is necessary to decentralize the needs analysis. This allows each college or department to determine the pro's and con's involved between their "must have" and "want to have" cabling requirements. The college will also be able to determine whether or not it has the technical staff to perform the addition or change, and to maintain the cable plant records. In the event that the college does not have qualified staff, the college may choose to contract out the work using one of the District-approved vendors. Effective April 15, 1988, approved vendors include the following:

[] Federal Communications Contractors, Inc.
3121 S. Fair Lane
Tempe, Arizona 85282
(602) 438-9121
Contact: Scott Rosenberg

[] Orbital Transport Services
One East Camelback, Suite 550
Phoenix, Arizona 85012
(602) 256-6356
Contact: Paul Roth

If the college chooses to perform its own installation, the college will be responsible for maintaining the wiring standards and installation quality cited in this document. The college will also be responsible for updating the hardcopy cable plant records and jack maps as well as the cable plant records.

Cable plant installations and documentation will be audited by the District Telecommunications Office on a regular basis. If, in the course of these audits, or in the course of daily operations, it is determined by District Telecommunications or Computer Repair Services personnel that any of the college installed cabling does not meet the approved standards, or that cable plant documentation has not been adequately maintained, the District Telecommunications Office will be allowed to contract an approved outside vendor to have the non-standard area brought into compliance and back bill the appropriate college for the charges.

It is strongly recommended that the District Telecommunications Office and District Computer Repair Services be included in any planning for voice/data/video service additions/moves or changes that would effect entire departments or large employee work groups.

STANDARDS SECTION
STANDARD A: DOCUMENTATION AND LABELING

Documentation will consist of cable records, test records, and record drawings prepared by the vendor, and submitted in original form on vellum or other reproducible media for advance acceptance by MCCD.

Cable Records

The vendor shall prepare and submit complete and accurate cable records showing every splice and cross-connect by cable pair and terminal number. The cable numbering system will be consistent with that already established by MCCD.

Test Records

Every pair in every cable must be tested on an end-top-end basis after splicing and terminating. Defective pairs will be clearly identified as defective at both ends of the cable. Test record forms must be submitted to MCCD upon completion of tests. Maximum allowable defective pairs will be limited to 1% of the total number of pairs and a maximum of two (2) defective pairs per 25-pair binder group.

Record Drawings

Site drawings will be supplied on reproducible material. These drawings will include the following:

1. Distribution cabling system
2. Exact route of total outside plant including trenching and tunnel routes
3. Depth of cable trench
4. Locator coordinate measurements from cable location to nearest building.
5. Cable pair count, wire gauge and cable lengths of every cable included in the system.
6. Conduit fill ratio

Floor Plan Drawings

Floor plan drawings will include the following as a minimum.

1. Entry and IDF terminal locations
2. Riser drawings showing corrected terminal location numbers and conduit sizes.

Nameplates and Tags

It is MCCD's practice to place some form of identification on each cable and piece of equipment, conduit and terminal enclosure. Vendor shall provide and install MCCD approved marking tags to meet this requirement. Polyethylene tags secured by nylon cable ties will be used for all locations. Lettering shall be reflective black on yellow background for all markings. Tags on terminal locations shall show the cable sheath identification.

Identification markings shall be made at the following types of locations:

- [] All cross connect terminal boxes.
- [] Cables in the underground on both in and out sides for cables that are spliced within the manhole or pullbox/handhold.
- [] Exposed conduits near each end and approximately every 100 feet.
- [] Cables at the entry point into a building, both inside and outside.
- [] Splice cases for line splices, diminish/taper splices, terminal box splices and secondary cable stub splices.
- [] Marking specifications apply equally to twisted pair, fiber optic and broadband systems.

STANDARD B: BASEBAND/ETHERNET

The different ways of physically connecting devices with each other on a network are commonly referred to as topologies. For example, the common-bus topology is one of several available topologies. Physical connection in this type of system is usually, but not always, a coaxial cable by which any number of devices can be tapped into.

Ethernet is a network which is implemented in a common-bus topology, typically with a 50-ohm coax cable. Data is transmitted directly as digital signals at a rate of 10M bits per second. With this type signal, only one device can transmit at a time. This form of data transmission is referred to as baseband.

Baseband standards for Ethernet are derived from Digital Equipment Corporation (DEC) Ethernet standards. Other documentation, such as network configuration maps, may be obtained from the MCCD Net Support system. Additional Ethernet specification details can be obtained from the following sources.

- [] MCCD Systems Manager at Information Technologies Services (ITS)
- [] Account Executive at Digital Equipment Corporation (DEC)
- [] Network and Communications Buyer's Guide, DEC

Thick Wire Cabling

The following standards should be observed when planning for standard (thick wire) Baseband/Ethernet cabling:

- [] A single cable segment can be up to 500 meters (1640 ft.)
- [] Multiple cable segments can be linked together with barrel connectors. A maximum of 100 transceivers (H4000) can be used on standard Ethernet cable segments. A repeater or bridge connects segments of Ethernet coaxial cable, creating larger local area networks (LANs).

ThinWire Baseband/Ethernet Cabling

ThinWire Ethernet cabling runs using BNC connectors can be up to 185 meters (600 ft.) and shall be connected to thick wire segments via a DEMPR or DESTA.

Connection of Other LANs to Ethernet

As specified by the Net Support guidelines, other local area networks (LANs) may be connected to the Ethernet Baseband if they comply with the following criteria.

- [] Documentation of LAN provided for Net Support
- [] LAN meets MCCD preferred connect method formats in connecting to
  1. The universal cable plant
  2. Ethernet
  3. Microwave

[] Connecting devices must be among the following MCCD approved units.

1. Kinetics Bridges
2. Delni (DEC)
3. DECservers (DEC)
4. MUXserver (DEC)
5. Vitalink Bridge
6. DEMPER/DESTA
7. 3Com bridge
8. Novell bridge
9. PC Ethernet

STANDARD C: TWISTED PAIR FOR DUPLEX VOICE/DATA JACKS

The following standards shall be observed when planning for twisted pair voice/data jacks.

Device Box

Contractor shall install a standard 2x4 device box at each V/D jack location, with 3/4" conduit stubbed up to accessible ceiling space, or run to a wiring closet with Telephone Mounting Board (TMB). This box shall be at a height consistent with all other device boxes in the area unless otherwise specified. Faceplates shall also be consistent with other faceplates in the area.

Jacks

Jacks shall be AT&T 106BFD or equivalent. The jack shall be installed and numbered in sequence with other jacks in the building. In the case of a new building, jacks shall be numbered in sequence starting with "1." These numbers will be designated both on the faceplate, and on the jack itself in a permanent manner. NEATLY hand-marked with permanent marker is acceptable.

Wiring to Jacks

There shall be at least two (2) three-pair twisted-pair 24-gauge wires to each jack with standard telco color-code (blue/white, orange/white, green/white) and wired in a standard telco RJ-11 configuration.

Wire Routing to Telephone Mounting Board

Wires shall be routed to the Telephone Mounting Board in accordance with all applicable building codes. No station run shall be longer than 150 feet.

The wires shall be terminated at the TMB on telco standard "66-type" blocks. Separate blocks will be maintained for wires from the Voice or "A" side and the Data or "B" side. In an existing facility, patterns and documentation shall be followed according to existing facilities. In a new building, A- and B-blocks shall be installed side-by-side, where jack 1 terminates at the same place on the A-block as the B-block. Each A and B termination shall be labeled with the correct jack number on both blocks.

Documentation

Written documentation shall be provided for all installed communications outlets. A to-scale floor plan with jack locations indicated by triangles, and assigned number will be provided, along with any cross-connect information to existing cable plant. In the case of an existing facility, new jack documentation will be added to the existing documentation.

Intrabuilding Cable

On new buildings or substantially remodeled buildings, vendors must provide enough wiring to meet the immediate requirements listed by the college and provide for at least 30% spare capacity to each equipment closet. In addition, at least 25% of the wiring to the "B" jack must be run from the nearest equipment closet back to the Main Distribution Frame (MDF) from each building on campus.

Preapproval of Routings/Designs

Proposed "as-built" cable placement and routing drawings shall be submitted and approved by the college and the District Telecommunications Department prior to the start of any work.

Workmanship and Appearance

Workmanship quality and neatness of appearance shall be as important as the electrical and mechanical efficiency of the cable plant.

Terminal Outlets

Specifications for telecommunications terminal outlets are as follows:

1. Outlet boxes must be made of zinc-coated or cadmium plated sheet steel. Boxes shall be one piece stamped sheet steal; spot welding or riveting shall not be permitted. Outlet boxes in finished ceiling or walls shall be fitted with appropriate covers, and set to come flush with the finished surface. Sectional switch boxes or utility boxes will be permitted where raceways are fished or otherwise concealed.
2. "Back-to-back" outlets in the same wall or "thru-wall" type boxes will not be permitted. An 8" (minimum) long nipple must be used to offset all outlets shown on opposite sides of a common wall to minimize sound transmission.
3. Unless specified by the college/center, outlets shall be located as listed below. Dimensions given are from finished floor to center line of outlets except panels. Adjust heights of outlets in masonry walls from that indicated here so outlet box will set in corner of block or brick and align with the mortar joints. Outlet height so adjusted shall be consistent in one direction.
   a. Standard Telecommunications Outlets shall be at a height to match electrical outlets in the room.
   b. Wall mounted Telecommunications Outlets shall be 48" for wheelchair access.

Device Plates

Device plates for Telecommunications Outlets should match electrical plates in the room.

STANDARD D: DISTRIBUTION SYSTEM REQUIREMENTS

For the purpose of this document, the term "distribution system" refers exclusively to the twisted-pair, copper conductor cable network; the major purpose of which is to interconnect station instruments and other terminal devices to the line cards of the switching systems (i.e., voice and data). It specifically does not include similar or other types of transmission facilities - cable or otherwise - that might be provided as transmission media between the centralized element (main node) and the distributed elements (remote nodes) of a switching system. Major elements of the distribution system include the following.

1. The standard exchange-type telephone cable itself which is defined as paired, multiconductor, thermoplastic-insulated, copper cable characterized by a mutual capacitance at 1000 Hz of 0.083 microfarad per mile.
2. Terminating hardware which typically includes the following: a distributing frame to interface the distribution network to the line side of the switch; distribution terminals to interface the distribution network to the station instruments and other terminal devices; and, intermediate cross-connect terminals in between to interface one segment of the distribution network to another.
3. Associated structures to support or house the cable, such as building-entry conduit, building conduit, pull-boxes, handholes, major underground conduit structures, and subsidiary conduit installed in association with direct buried cable for street crossings, etc.

Cable Specifications and Design Requirements

The following standards for cable specifications and design requirements shall be observed.

1. All provided cable must be standard exchange-type telephone cable as defined in the section on voice/data standards for twisted pair.
2. Only 24 or 22 AWG cable may be used in the distribution network; selection of wire gauge must be as follows:
    a. Intrabuilding cable must be 24 AWG and must meet all electrical code requirements.
    b. Interbuilding cable must be selected based on standard resistance design procedures, taking into account the signalling limits of the switching equipment. Loop resistance calculations shall be based on cable temp erasures of 68 degrees F.

3. Cable must be selected in accordance with the following selection chart.

Application	Conductor	Core	Sheath
Intrabuilding Cable (Vertical Riser)	Solid or Foam/Skin	Air	Alpeth or Alvyn
Intrabuilding Cable (Horizontal Cabling)	Solid	Air	Alpeth
Distributing Frame Terminating Stubs	Solid	Air	Alvyn
Interbuilding Cable (In Conduit)	Foam/Skin	Filled	ASP
Interbuilding Cable (Steam Tunnel)	Foam/Skin	Filled	Alpeth

4. Station wiring shall be uniform throughout the system except where specifically noted.
5. Station device power must be provided from the local distribution closet, building distribution frame, or switching system. All exceptions to this specification require prior approval by MCCD. Station wire must be run from each station jack to its associated local distribution closet, and from there must cross-connect to the building distribution frame. Unless otherwise approved, there must be at least one intermediate distribution frame per floor in each building.
6. Sufficient cable pairs must be run from the building distribution frame to the system main distribution frame (or the appropriate system node distribution frame) to support all wired voice, data and control functions on the outlet for all jacks. No building entrance cable will be less than 25 pair, unless otherwise approved.

Distributing Frame Requirements

The following distributing frame requirements shall be observed.

1. Distributing frames must be metallic, preferably single-sided and equipped with "high density" connector blocks and terminal blocks. They must be sized to accommodate initial cutover requirements plus 25% growth.
2. Terminal blocks must be compatible with the distributing frame and connector blocks provided. Blocks of 100-pair each are desirable.

3. Distributing frame(s) must be grounded, by means of an insulated copper ground wire, to a low resistance earth ground, such as copper ground rods or a copper water pipe system. The maximum permissible resistance to ground, including the resistance of the ground wire, is five ohms. The grounding system for the frame(s) must be separate from that provided for the switching equipment.

Distribution Terminal and Intermediate Cross-Connect Terminal Requirements

The following distribution terminal and intermediate cross-connect terminal requirements shall be observed.

1. Sufficient distribution terminals must be provided and properly located so as to limit station wiring runs to 150 feet maximum. Connecting blocks shall be compact, with quick-connect terminals (66 blocks).
2. Building entrance terminals must provide carbon protection for all interbuilding cable pairs terminated, and allow for the use of jumper cables to perform cross-connections from the front of the terminal.
3. Building terminals constructed in utility or similar type closets will require protective housings, as well as terminals constructed in work spaces, hallways, and other such exposed areas.
4. Building terminals must be of modular construction to facilitate future additions and rearrangements.
5. To conserve wall and floor space, all large building terminals must be frame-mounted as opposed to wall-mounted. A large terminal is defined as one larger than 1200 total pairs terminated. The frame for such terminals must be sized to accommodate 25% growth beyond the number of pairs terminated initially. This requirement refers only to locations where cable is terminated, not station wire.
6. Building-mounted distribution terminals, normally mounted against exterior building walls, inside a housing, must provide carbon block station protection, if needed, in addition to terminating facilities for cable pairs and inside station wiring.
7. Buried service wire terminals, used to feed buried service wires, need not provide station protection as such protection is provided at the station end of the service wire.

Splicing

The following splicing requirements will be observed.

1. All cable splices must be protected from damage at sheath openings by mechanically protecting all conductors utilizing 3M Scotscast Brand Pair Saver 4458 or equivalent which must be approved by MCCD.

2. All cable shall be thoroughly cleaned and scuffed in an appropriate manner to insure a good mechanical bond when splicing or pressure blocking. Scotscast Brand #4435 nonconductive aluminum oxide abrasive strip, or MCCD approved equivalent, shall be used. All cable, filled or nonfilled, shall be thoroughly cleaned with a nontoxic, environmentally safe solvent, 3M Scotscast Brand 4414, 4415 or MCCD approved equivalent.
3. All splice closures for use on direct burial or underground nonpressurized systems shall be manufactured of clear self-extinguishing, cylindrical two piece tongue and groove fitting P.V.C. Spacer webbing shall be permanently adhered to the inside of the closure to maintain minimum compound fill. End caps must be tapered and flexible and be capable of separate cable entries. Rigid bonding and strain relief bar(s) must be an integral part of the finished closure. Nonenterable polyurethane compound shall be used unless otherwise specified. Reenterable polyurethane compound may be used when specified. 3M Brand Better Brand Gella 4411 (reenterable) or MCCD approved equivalents shall be used as appropriate.
4. All vacant or cable filled ducts shall be sealed with an 8 to 1 ratio expandable urethane foam, 3M Scotscast 4416 or MCCD approved equivalent.
5. All cable splices shall be supported by a minimum of two cable hooks. Where vertical racking is not present, horizontal racking for support may be used utilizing 3M Brand RC-100 rack adapters or MCCD approved equivalent.
6. Underground cable splicing shall utilize 3M-MS2 4000 series supermini modular connectors. This will include use of "sealant boxes" (type 4075-S or 4076-S) for added moisture protection. This modular splicing will be used in the underground portions of the project. Vendor shall mark or tag the cable pair count spliced on the cable splicing housing.
7. Splicing of cross-connect terminals (and secondary cable access stubs) not in line or straight splice of diminish/taper splice locations shall utilize Scotchlok - ULG splicing connectors or MCCD approved equivalent.
8. 3M splicing closures or MCCD approved equivalent will be used for splicing throughout the cable system.
9. MS2 Modular Connectors will be installed with cable on the outside plant side of the Main Distribution Frame. The outside plant shall be spliced to incoming cables by the vendor utilizing splicing procedures detailed above.

Associated Structures

The following requirements for associated structures, conduits and pull-boxes shall be observed.

Conduits

1. All conduit runs less than 100 feet from point-to-point shall not contain more than two 90 degree standard factory bends or three 90 degree 24 inch radius bends.
2. All conduit exceeding 100 feet from point-to-point or exceeding two 90 degree bends shall contain accessible pull boxes.
3. Conduit runs shall not contain square or oval conduit fittings.
4. All feeder conduits to telephone terminal cabinets shall enter top or bottom on the extreme right or left side of the box.
5. Intrabuilding conduit guidelines are as follows:
   a. 3/4" conduit shall be placed for every telecommunications outlet
   b. 1" conduit shall be placed for every video outlet
   c. There shall be one (1) telecommunications outlet for every workstation, every conference room and every classroom with special purpose rooms (i.e. teleconference rooms) having additional outlets added as specified by the college/center.
   d. There shall be three (3) video outlets for every classroom and a minimum of two (2) video outlets for every conference room with special purpose rooms having additional outlets as specified by the college/center.
6. Vendor shall provide 3/32" O.D., 200 lbs. strength polyethylene pull lines in all conduits with less than 50% fill ratio.

Pull-boxes

1. Pull-boxes shall be provided in accessible positions. Screw covers shall be provided and the box shall be labeled "telephone."
2. Pull-boxes shall have the following sizes:
   a. 6" x 6" x 12" for 3/4" conduit runs
   b. 4" x 4" x 36" for 1" through 2 1/2" conduit runs
   c. 6" x 6" x 26" for 3" and larger conduit runs.

STANDARD E: PIN OUTS/CONNECTORS/TERMINATION DEVICES

Pin outs for data adapters, punch block, and terminal servers are included in Appendix A of this document. More detailed information may be obtained by contacting the Manager of Repair Services at the Maricopa Community College District Office.

STANDARD F: COAXIAL CABLE-BASED BROADBAND

The coaxial cable-based broadband network must be identified with the following characteristics. Information in this section was extracted from pages 122 through 140 of the Telecommunications Request for Proposal (RFP) document.

1. The broadband network shall be comprised of one mid-split media cable for forward and reverse transmissions, and two spare mid-split cable without electronics.
2. The distribution point/headend of the network is to be located in the building with the main telephone switching equipment.
3. Identify all equipment needed at the distribution point/headend and the costs.
4. The broadband network shall follow the same route as the distribution for the telephone system, utilizing MCCD tunnel systems and separate conduit as specified in this document and identified on supporting drawings.
5. The proposed network must have the ability to provide channelization to support data speeds of 2.4 KBPS, 4.8 KBPS, 9.6 KBPS, 19.2 KBPS, 56 KBPS, 64 KBPS, 1 MBPS, 1.544 MBPS (T1), 6 MBPS, and 10 MBPS (sync and async). Identify the cost to support each speed.
6. The proposed network must support black and white video (4 MHZ) and full motion color video (6-10 MHZ) and studio grade (20 MHZ) color video. Identify the cost for each.
7. The network must include all equipment, power supplies, etc., to be a fully functioning network at acceptance.
8. Provide a list of devices and technical specifications to interface the network for each of the data speeds and video capabilities detailed in paragraphs 5 and 6 above.
9. Provide an equipment list and unit pricing for each of the major components of the proposed broadband network including a price per ;installed foot of the media, amplifier equipment, splitters, etc.
10. Describe and provide pricing on all gateways that are available on the proposed telephone system to interface with the proposed broadband network.
11. Detail how channelization will be allocated in both the forward (downstream) direction and the reverse (upstream) direction for the proposed network.
12. Contractor will assume responsibility for complete design and engineering of the broadband system in accordance with the technical criteria identified within these specifications.
13. A coaxial cable-based broadband system will meet the following system specifications.
    a. The system shall provide for distribution of 5 to 400 MHz carrier for television, T1 carrier, and pilot carriers, as described under "Performance Specifications."

b. The coaxial cable fittings and connectors shall have a characteristic impedance of 75-ohms (30-dB return loss).

c. The Broadband shall be designed for dual pilot carrier Automatic Slope/Level Control operation, preferably using video carrier frequencies.

d. Automatic Level control amplifiers shall be placed at suitable trunk and feeder locations.

e. Maximum of two (2) line extenders will be installed in cascade.

f. Trunk lines shall not be tapped for user connections.

g. Splitting of trunk lines and distribution lines will be permitted.

h. Feeder or distribution cable shall be utilized to provide tap-offs to individual user locations; such feeder lines shall be connected to a trunk-line cable through high-isolation bridging amplifiers.

i. Built-in test points shall be provided for system maintenance at input and output of trunk amplifiers and distribution amplifiers.

j. All passive devices shall be rated to pass a continuous ten (10) ampere of AC current at 60V AC, except multitaps, which shall be rated to pass a continuous six (6) amperes at 60V AC.

k. The system shall be operational between -40 degrees and +140 degrees, Fahrenheit.

l. The system shall be designed for 500% tapping, based on the location count for buildings to currently be served. If this count indicates a requirement for more than eight (8) drops, a directional coupler shall be installed with an output 10-dB higher than the minimum multitap specified.

m. The system shall be capable of two-way operation.

n. The system shall meet all applicable FCC regulations in effect at the time of construction.

14. A coaxial cable-based broadband system will meet the following active equipment specifications.

a. All active circuitry in the equipment used shall be fully solid state. Fuses or circuit breakers shall be provided for protection of the equipment from damage due to overload. All RF ports shall contain surge arrestors.

b. The equipment shall be remotely powered through the coaxial cable by means of regulated transformers, and equipment shall be so designed as to cause only alternating current to flow in the coaxial cable.

A suitable RF power line filter shall provide not less than 46-dB of RF attenuation on the AC path. Circuit breakers shall be provided in the energized side of the service entrance of any devices that are to be connected to the power utilities secondaries.

c. Equipment performance will be such that all specified system performance parameters will be met.
d. All trunk amplifiers of the system shall operate with uniform output levels, except as affected by temperature and peak-to-valley specifications.
e. No more than 40-dB of trunk cable shall exist between active devices without both containing Automatic Level and/or Slope Control.
f. System shall be equipped with redundant power supplies at the headend location.
g. System shall be equipped with network monitoring capabilities. Identify all network monitoring equipment and their capabilities along ;with component costs.
h. Broadband system software must provide for alpha-numeric host identification.
i. System software must provide data security at the terminal device level.
j. If proposed system utilizes subchannel division, user access to adjacent channels must be provided transparently.

15. A coaxial cable-based broadband system will meet the following cable specifications.
    a. All coaxial cables used in the system shall have a nominal characteristic impedance of 75 +/- 2-ohms over the entire specified frequency range, except as noted below.
    b. All trunk and feeder cable in the system, except as noted below, shall meet the following requirements, and shall be tested for return loss and attenuation on site. Prior to installation, acceptance of cable must be obtained in the form of acceptable test data measured by the Proposer.
    c. Trunk lines shall use .500" aluminum cable. Distribution (feeder) lines shall use .500" aluminum cable.
    d. All intrabuilding trunk and feeder cables in the system shall have an aluminum outer conductor, foam polyethylene dielectric, and copper-clad center conductor.

e. All interbuilding trunk and feeder cable in the system, within conduit, shall have an outer black jacket of polyethylene (0.040" min.), aluminum sheath outer conductor with a flooding compound between the jacket and aluminum sheath, foam polyethylene dielectric, and copper-clad center conductor.

f. All direct buried trunk and feeder cables in the system shall have a black outer jacket of polyethylene (0.040" min.), steel armor protective shield, black polyethylene inner jacket (0.040" min.), aluminum sheath conductor with flooding compound between the inner jacket and the aluminum sheath, foam dielectric, and copper-clad center conductor.

g. Drop lines shall use quad shielded RG-6 type cable.

h. All trunk and distribution cable shall be marked at the factory with color stripe on opposite sides of the outer jacket that will serve as an identifier. Recommended colors are orange or yellow. These stripes shall be permanently affixed to the jacket, be water and oil proof, and not separate when the cable is bent.

i. True structural return loss shall be 30-dB minimum from 5-400 MHz.

j. Attenuation shall be based on the manufacturer's maximum rated loss in dB per 100 feet at 50 and 400 MHz at a stabilized ambient temperature of 60 degrees, Fahrenheit, corrected to 110 degrees, Fahrenheit, for system layout design.

16. Performance Specifications - Trunk Cables shall meet the following specifications ass expected performance between any two (2) self-contained points of the trunk transportation systems with carriage of 35 video channels.

    a. Gain Versus Frequency Response (peak-to-valley) within the respective pass band, shall be no greater than 0.5-dB across any 6 MHz segment.

    b. The maximum overall excursion from ideal Gain Versus Frequency Response (50 to 400 MHz) at any trunk amplifier station shall not exceed N/10 + 1-dB.

    c. The Carrier-to-Noise within a 4 MHz bandwidth at 85-ohms shall be (59-10 logN) or better.

    d. The Carrier-to-Hum Ratio shall be (70-20 logN) or better.

    e. Carrier-to-Cross Modulation shall be (85-20 logN) or better.

    f. Carrier-to-Second Order Ratio A-B singular discrete component shall be equal to or better than (85-10 logN) for cascades 10 amplifiers or less.

g. Carrier-to-Composite Triple Beat Ratio shall be measured with system fully loaded with 54 channels and shall be (82-20 logN).

h. Trunk operating levels shall not vary more than +/-1.5-dB over the temperature range 0-100 degrees, Fahrenheit, and +/-2.75-dB over the temperature range -40 +/-140 degrees, Fahrenheit.

i. User location Tap-Up to and including 20 Trunk Amplifiers, bridger, and two (2) line extenders. The combined forward Trunk and Distribution System will deliver signals at each and every tap that will meet or exceed the following specifications over the temperature range of 0-100 degrees, Fahrenheit, unless otherwise indicated.

j. Peak-to-Valley, any 6-MHz video channel, 0.75-dB.

k. Peak-to-Valley, 50-400 Mhz +/-(N/10 +2.5)

l. Carrier-to-Noise (4-Mhz bandwidth), 45-dB

m. Carrier-to-Hum (includes PS switching frequency), 43-dB

n. Carrier-to-X-Mod (NCTA STD 0267, 54 channels), 51-dB

o. Carrier-to-Second Order (Single), 63-dB

p. Carrier-to-Composite Triple Beat, 49-dB

q. Carrier-to-Echo Ratio (greater than two microsecond displacement), 40-dB

r. Differential Gain, 0.5-dB

s. Differential Phase, 1 degree

t. Differential Group Delay @ 58.83-MHz, 18.5 Nsec. 1 as referenced to 55.25-MHz, 17.5 Nsec. 2

u. Minimum visual Carrier Level, Ch. W (55 degrees Fahrenheit), +10-dBmV 3

   aa) Maximum Visual Carrier Level, Ch. W (55 degrees Fahrenheit), +15-dBmV 3

   bb) Minimum Visual Carrier Level, Ch. 2 (55 degrees Fahrenheit), +4-dBmV 3

   cc) Maximum Visual Carrier Level, Ch. 2 (55 degrees Fahrenheit), (6-dB variance from W)

   dd) Maximum Visual Carrier Level Change from 0-100 degrees, Fahrenheit, 3.0-dB

   ee) Isolation between User locations, 36-dB 4

17. Return Distribution - The following specifications are expected performance between any two (2) self-contained points in each transportation system with carriage of 3 video channels, pilot carrier, and data in 55 degrees, Fahrenheit. (Except where indicated otherwise, and at operational output levels.)

a. The Gain Versus Frequency response ;within the respective pass band shall be no greater than 0.75 -dB.

b. When measured at the last balance temperature, the Frequency Response at any and all amplifier stations will not exceed N/10 + 1-dB, 6-30 MHz.

c. The Carrier-to-Noise Ratio within a 4 MHz bandwidth at 75-ohms shall be (67-10 logN+), where N+ is the total number of return distribution amplifiers converging at any trunk station.

d. The Carrier-to-Hum Ratio shall be 1.0% or better.

e. The Carrier-to-Cross Modulation Ration shall be (98-20 log N) or better.

f. The Carrier-to-Second Order Ratio (A-B) singular discrete component shall be (75 - 10 log N).

g. Operating levels shall not vary more than (0.0012 x dB of cable x degrees Fahrenheit of temperature change), or more than 2.0-dB from those levels achieved at balance, as measured at the output ;of any AGC station over the temperature range of 0-100 degrees Fahrenheit. Should the ambient temperature exceed these limitations, the levels will not vary more than additional 2.0-dB

h. Chroma delay, carrier plus 3.58-MHz "relative," shall not exceed (N x 10 nsec) for a TV channel whose visual carrier is 19-MHz.

18. Degradation of performance will not exceed these values with bi-directional capabilities utilized throughout all cables.

19. Except as modified by Peak-to-Valley Specifications.

20. Based on 50' RG 6/U Drop Cable.

21 Suggested Equipment/Material Manufacturers are:

   a. General Instruments/Jerrold
   b. Comm/Scope
   c. Gilbert

22. Cable Testing

   a. Cable frequency sweep or time domain reflectometer (TDR) data performed on the reels of cable or on specific lengths of cable after installation and mounting are required to insure that no structural damage has occurred. TDR testing is recommended and the cable structural return loss shall be better than 30-dB.

   b. Shall be performed on each reel of cable after delivery to the job site in order to detect any cable defects before installation.

   c. Shall be performed on each section of cable between each trunk amplifier after installation in order to detect any cable defects resulting from the installation.

   d. Shall be performed on each section of cable between each trunk amplifier or directional coupler and each distribution amplifier in order to detect any cable defects resulting from the installation.

23. System Alignment

a. Trunk amplifier forward paths shall be adjusted to deliver flat outputs. In this method the amplifier equalizers are adjusted to achieve equal signal strength at all frequencies at the trunk amplifier forward output test point. Thus, each forward trunk amplifier compensates for the slope of the cable that precedes it. Adjust the output level to that specified in these specifications. The input levels may vary (+/- 2dB) because of tolerance build-up.

b. Distribution amplifier forward paths shall be adjusted to deliver flat response at the midpoint of the distribution tap run. Thus, each forward distribution amplifier compensates for the slope of the cable that precedes it as well as one-half of the cable that follows it. Adjust the output level to that specified in these specifications. The input level may vary (+/- 2 dB) because of tolerance build-up.

c. Trunk amplifier return paths shall be adjusted to deliver flat inputs to the following trunk return amplifier. In this method the return amplifier equalizers are adjusted to achieve equal signal strength at all frequencies at the following trunk return amplifier input test point. Thus, each trunk return amplifier compensates for the slope of the cable that follows it, in the return direction. Adjust each trunk amplifier to the value specified in these specifications. The output level may vary (+/- 2 dB) because of tolerance build-up.

d. Distribution amplifier return paths shall be adjusted to deliver flat response at the input of the following trunk return amplifier when a flat sweep signal is injected at the midpoint of the distribution tap run. Thus, each distribution return amplifier compensates for the cable that follows it as well as one-half of the cable that precedes it in the return direction. Adjust each distribution amplifier to give the value specified in these specifications. The output level may vary (+/- 2 dB) because of tolerance build-up.

24. Alignment Set-Up

a. The forward path shall be aligned utilizing a sweep or a variable signal generator located at the headend and a spectrum analyzer or a field strength meter at each trunk amplifier output and at the midpoint of the longest distribution branch for each distribution amplifier. Adjust each trunk amplifier for flat output at the forward output test point and adjust each distribution amplifier for flat output at the midpoint. Amplifier output levels shall be as specified herein whenever TV visual carriers of 56 dBmv are injected into the headend combiner (HC-8) port(s).

b. The reverse path shall be aligned utilizing a sweep or variable signal generator located at the midpoint of the longest distribution branch for each distribution amplifier. Adjust each distribution return amplifier to obtain flat input at the specified level into the following trunk return amplifier when TV visual carriers of 56 dBmv are injected into the midpoint. Adjust each trunk return amplifier with a flat input and the specified input level to obtain a flat input at the specified level into the following trunk return amplifier or out of the headend return splitter (HC-8) port(s).

25. Final System Alignment Data

a. Forward and return input and output levels at each amplifier and stand-alone equalizer.

b. Forward sweep response at each trunk amplifier output and at mid-span for each distribution amplifier.

c. Return sweep responses at each trunk amplifier input from each branch feeding each trunk amplifier.

26. Proof of Performance

a. Upon completion of the system installation, it shall be the responsibility of the Contractor to perform the necessary adjustments and balancing of all signals and amplifier level and equalizing controls to ensure proper system operation. Before the Contract shall be considered completed, the Contractor shall conduct a Proof-of-Performance test. This is to demonstrate the systems ability to operate within the requirements of these specifications. The Contractor shall submit a final Test Plan to MCCD for approval a minimum of 30-days before the final testing is to begin. The test shall be performed in the presence of MCCD, and the Contractor will furnish all equipment and personnel required for the test. One week notice is required for notification of the Project Manager.

On-site measurements for each segment will be conducted and recorded at two (2) test sites. One of the test sites shall represent the longest system cascade and shall include ;the measurements as required by FCC Technical Standards, Part 76, and the system specifications. The system shall be tested for the following.

1) Visual carrier frequencies
2) Aural carrier frequencies
3) Visual carrier levels

    4) Aural carrier levels
    5) TV and related frequency spectrum flatness
    6) Low frequency disturbances
    7) In-channel frequency response
    8) System S/N ratio
    9) System co-channel interference levels
    10) Intermodulation and spurious signal levels
    11) Subscriber terminal isolation
    12) Cable and equipment radiation levels

  b. At the completion of on-site measurements, all collected data will be edited and compiled by the Proposer into a report which details system performance. MCCD reserves the right to contract a third party of its own choosing to verify any or all Proof-of-Performance results. Additional supportive documentation will be appendixed in the following form:
    1) Detailed list of test equipment used, to include nomenclature, model, serial number, and last date of calibration.
    2) Detailed block diagrams for each measurement procedure, with verbal description of measurement technique.
    3) Name of personnel who performed the tests.
    4) Formulas, charts, etc., used to compile data into standard format.
    5) Three (3) copies of the final report will be submitted to MCCD.

27. Installation
  a. All equipment shall be installed in a neat and workmanlike manner and to the complete satisfaction of the MCCD representative. All equipment installation and wiring shall conform to the National Electrical Code, applicable local codes, and the practices of the National Cable Television Association.
  b. All equipment power wiring and grounding shall conform to the National Electrical Code and applicable local codes. Electronic equipment, racks, amplifiers, antennas, and towers shall be grounded using a No. 6 solid copper wire. Also, grounding at every amplifier and power supply location is required.
  c. Cable shall be adequately supported at least every 5 feet; connectors shall be suitable for the cable specified. Cable supports must not cause crushing or distortion of the cable, nor cause bends more than the minimum permitted for each type cable, as specified by the cable manufacturer. Drop cable that is surface mounted shall generally be inside of conduit, raceway, or wiremold to protect it from damage.

d. All trunk and distribution cable shall be marked at the factory with a color stripe on opposite sides of the outer jacket (orange is recommended) that will serve as an identifier. The stripe shall be permanently affixed to the jacket, shall be water and oil proof, and shall not separate when the cable is bent.

e. Physical separation between input and output cables shall be maintained within racks and terminal cans. All cables shall be labeled as to input and output, and by runs per drawings at each device to which the cable attaches.

f. All penetrations through fire walls shall be filled with suitable fire-stop material such as Nelson fire-stop putty or rockwool (not fiberglass), including all vertical penetrations through floors, and horizontal fire wall penetrations from corridors to offices, labs, etc.

g. All trunk feeder and drop cabling through offices, administrative areas, and other architectural areas noted on drawings shall be concealed in trays or raceway. when using raceway, it shall be appropriate to the space, generally wiremold with the directional coupler tap housings concealed in metal boxes sized sufficiently to allow for cable bending radii.

h. All exposed 1/2 and 3/4 inch cable shall be at least 8'6" above the floor whenever possible. All drop cable that is required to be in wiremold shall be in the wiremold from 8' above the floor down to the termination, which shall be at the same height above the floor ass existing electrical outlets in each room.

i. All cabling shall be routed to prevent interference with any existing systems such as access boxes, ventilation mixing boxes, access hatches to air filters, switch panels, fire alarm equipment, clock systems, lighting fixtures, etc. The cable routing must not interfere with any other service or system, operation or maintenance. The Contractor will be responsible for re-routing any cabling that is not acceptable to MCCD at no cost to MCCD.

j. All equipment shall be suitably mounted in cabinets, closets or tunnels or otherwise solidly supported. Equipment suspended by its coaxial cable or connector is not acceptable. Shop drawings of proposed mounting of equipment will be submitted for approval by MCCD.

k. The recommended method of mounting amplifier housing is to securely mount a plywood backboard on the wall. Then fasten two D-rings (horizontally) to the plywood and then mount the amplifier housing to the D-rings using the clamps supplied with the housing. Securely mounting the D-rings directly to the wall is acceptable if the wall construction permits it. Whenever possible, the amplifier shall be mounted such that the hinged lid hinges down, providing access to the interior. In all cases, choose a mounting location that will permit the lid to be fully opened without interference from any other structures.

l. All taps must be mounted in order to provide easy, direct access to the tap ports, not facing away from the operator. Splitters and taps located in ceiling spaces, trays or raceways shall be securely attached to the adjoining structure such as the ceiling support wire or tray edge. Splitters or taps shall not be solely supported by the cable. The cable should also be supported within three feet either side of the splitter, tap or amplifier.

m. All outdoor and underground tunnel or conduit connections and splices shall be weatherproofed through the use of shrink tubing with precoated sealant or other approved methods. Direct buried (if any) of underground cabling shall be of self-sealing compound with armor. Underground cable in tunnels and conduits shall be of self-sealing compound as specified.

n. All connectors shall be installed in such a manner that the center conductor will adequately pass through the set screw to prevent any possible suck-outs. Care should be taken not to over tighten the set screws which may cause center conductor failure. All multitaps and directional devices shall be properly oriented in relation to the headend's signal flow direction and for ease of connection to the taps and protection from water drip.

o. Splices shall be kept to a minimum and only permitted where specified or when installation around existing structures/equipment is not reasonably possible without splicing.

p. Drop cables will be surface-mounted in conduit/raceway with a surface mount outlets. The outlets shall be at the same height as existing electrical outlets in each room unless directed otherwise by MCCD. Flush mounted outlets shall be installed to blend with existing outlets. The drop cabling shall not be subjected to sharp edges during installation through wall or ceiling structures. The installation of cable around removable devices, instruments, sub panels, etc., shall be provided with adequate support, length, protection, and flexibility so that the cable is not disturbed when the unit is removed.

q. The interior drop cabling, CAB-6 flexible cable, will be routed in the best way to keep a minimum length and near appearance. In all spaces, the vertical run of the drop cable terminating in an outlet shall be in wiremold. Surface mounted outlets shall be installed with the outlet to be the same height above the floor as the existing electrical outlets in each room.

r. Drop cable corridor crossings shall be attached to building structure, run in conduit, or run in wiremold where exposed. Crossings shall be in wiremold where trunk/feeder cable is indicated to be in tray or wiremold.

s. When the drop cable is run parallel to trunk/feeder cable, it shall be attached to the trunk/feeder cable at least every 12 inches.

t. When the drop cable is run exposed on building surfaces, it shall be firmly attached to the building at lease every 12 inches. Attachment to electrical conduits is not permitted.

u. The drop cable shall consist of a multishielded FEP jacketed cable with formed polyethylene dielectric, from the taps to each outlet as required.

v. Trunk and distribution feeds within buildings shall be installed above the false acoustic tile ceilings per the National Electrical Code whenever possible, otherwise shall be installed in conduit, wiremold, or cable tray.

w. Since each of the buildings involved is unique, requirements for cable routing are therefore different for each building. Some are relatively easy with adequate ceiling space and existing cable trays. Others require new cable trays and/or surface mounting of the distribution cable on concrete walls or ceilings. Some conduits and wall/floor penetrations are existing but in many locations, new penetrations will be required. Percussive drilling is NOT permitted; only core or rotary drilling is allowed which results in clean, sharp holes.

x. Exposed 1/2 inch cable shall be supported at least every 5 feet.

y. The use of polyethylene jacketed seamless aluminum cable with foamed polyethylene dielectric is required for distribution within each building. The use of polyethylene jacketed, flooded, seamless aluminum cable with foamed polyethylene dielectric is required for use in the underground tunnels and conduits.

z. Provide service loops (6" minimum) at each device to allow for thermal expansion and contraction, and to allow for possible replacement of the device.

aa. Any cable that is required to be installed in air plenum spaces shall meet NEC 725-2(b), and be approved for use in air plenums without conduit or the cable shall be installed in conduit.

bb. Cable tray shall be used for communications services in building corridors. In some areas, existing cable trays are to be used, and in other areas new cable trays shall be installed.

cc. All cable tray installations, including special and modified fittings, shall reflect a neat and workmanlike job.

dd. Cable tray fittings shall be installed to be free of any sharp edges or corners that could be damaging to cables. All changes in direction, elevation or size shall be accomplished with standard fittings. Mitered joints, etc. will not be permitted. All joints shall be mechanically and electrically secured with standard bolted splice plates.

ee. Cable trays shall be labeled with class of cable (i.e. "COMMUNICATION CABLE") consisting of a yellow background with 3/4-inch high black stencil letters on side of tray. Labeling shall be provided at 100 foot intervals.

ff. The necessary bolts, nuts, washers, etc., required for cable tray installation shall be galvanized steel or a material that is rustproof and is recommended or furnished by the manufacturer.

28. Approval

Any part of the system (installation or equipment) not meeting the requirements of this specification shall be corrected at no cost to MCCD.

GUIDELINE A: ENGINEERING/ENVIRONMENTAL CONSIDERATIONS

Design of a reliable, energy efficient, and safe data center facility requires careful planning in two general areas: "general considerations" and "essential elements." General considerations deal with all aspects of site selection and planning, and environmental considerations. Essential elements include electrical considerations, grounding, electromagnetic interference, temperature and humidity, and airborne contamination. This section provides requirements for each of the two areas, and refers you to documents where detailed information on each consideration may be obtained.

General Considerations

General considerations include site selection, site planning, and environmental considerations. Site selection planning, whether for a new or existing building, deals with space and location considerations. Site planning considers flooring, fire and safety, security, lighting, acoustics and other considerations. Environmental considerations include access flooring, static loading, fire suppression systems, and environmental products. A fire prevention plan must protect the facility from fire and high temperatures. The plan should employ a fire protection system which includes sensitive and immediate-response detectors, accessible controls, and a fire extinguishing agent (halon 1301). Information on these and other topics, which must be considered for a successful site selection and preparation, can be found in **Chapter 1 of the Computer Facilities Design Guide**.

A well designed and cost-effective security system should be implemented to protect the facility. Security systems can be configured to provide controlled access to facilities by authorized personnel, to monitor strategic areas, and in general, to protect confidentiality and to discourage unauthorized use of resources. Since there are many types of security systems, factors such as budget, convenience, and the desired level of protection should be considered. Security systems range from simple entry keys to sophisticated card-entry systems supplemented by closed-circuit television monitoring systems. Card key systems can provide controlled access to areas, along with audit information for each access station. More detailed information on security considerations can be found in **Chapter 1** of the **Computer Facilities Design Guide**, and the **SECURITY SYSTEMS** guideline section in this document (**GUIDELINE: SECURITY SYSTEMS**).

Essential Elements

Elements which are essential to the design of a computer facility include electrical and grounding, electromagnetic interference, temperature and humidity, and airborne contamination. The electrical and grounding phase is one of the most important of the design project. Adequate, properly grounded, and reliable power is crucial to the successful operation of any data center. Commercial power distributed to your building is not always within acceptable standards. A number of steps can be taken to alleviate this problem. First, a dedicated power source with an isolated ground should be considered. A power distribution/conditioning system is also recommended. It should be remembered that all electrical and grounding specifications must meet the National Electrical Code Standards. **Chapters II and III of the Computer Facilities Design Guide** provide considerable reference material in these two areas.

Control of electromagnetic interference (EMI) and static electricity are essential to a smoothly operating computer facility. EMI sources must be identified and controlled. Proper dissipation of static electricity is essential to avoid damage to equipment. Detailed information on EMI and static electricity can be found in **Chapter IV of the Computer Facilities Design Guide**.

Finally, a properly designed facility must include plans for temperature, humidity, and airborne contamination control. It must be capable of operating 24 hours per day, 365 days per year, while maintaining precision temperature control at 72 degrees, and a constant 45% humidity level. More detailed information on these considerations can be found in **Chapters V and VI** of the **Computer Facilities Design Guide**.

In summary, information on the following considerations can be found in the indicated chapters of the **Computer Facilities Design Guide**.

Chapter 1: General Considerations
Chapter 2: Electrical Considerations
Chapter 3: Grounding
Chapter 4: Electromagnetic Interference
Chapter 5: Temperature and Humidity
Chapter 6: Airborne Contamination

GUIDELINE B: T1/DS1 MICROWAVE NETWORK

GUIDELINE C: RELATIONSHIP OF VOICE-DATA-VIDEO COMMUNICATIONS TO ELECTRICAL ENVIRONMENT

Guidelines explained in this section are intended to establish the physical relationship between voice-data-video (VDV) cabling and electrical power cabling for both external cabling and internal cabling.

External Cabling

The following guidelines shall apply when cabling is being installed offsite, leading to a facility or building.

[] If possible, the VDV cabling and electrical cabling should be installed in separate excavated trenches. However, if the same common trench must be used, then the electrical cabling must be installed at the bottom of the trench and covered by a concrete cap in accordance with the project specifications. The VDV cabling shall be installed at least 24 inches above the electrical cabling in the same trench.

[] The VDV and electrical cabling shall have separate manholes, pull boxes, and junction boxes as they approach and enter the facility or building.

Internal Cabling

The following guidelines shall apply when cabling is installed within a facility or building.

[] The VDV and electrical cabling shall be installed in separate conduits whenever conduits are required by the project specifications.

[] In the rare case where the VDV and electrical cabling must run in the same raceway, the VDV and electrical cabling must be kept separate by a physical barrier which is color coded in such a way to indicate the difference in the two types of cabling.

GUIDELINE D: SECURITY SYSTEMS

The Maricopa Community Colleges currently do not have sufficient experience with security systems to establish standards. Several colleges have installed various types of security systems but no two systems are the same. The evaluation of protective features provided by a security system must take into account the cost of such features in comparison to the property value which the security system will protect. Not all areas of a facility need be protected by a security system. Instead, security protection should be considered only for those areas which can cost justify the protection.

Security protection systems vary depending on whether items (computer equipment, books, computer disks, etc.) or spaces (rooms, halls, offices, etc.) are to be protected. Other types of security protection systems control personnel access to areas where hardware, software, or information are kept.

The following outline addresses areas and levels of control. It is intended as a reference guide to show types of protective features to be considered when planning for a security system. The outline is organized by type of protection to be addressed (space versus access control, etc.).

- A. Perimeter control
  - 1. Card reader
    - a. Reader only
    - b. Reader with keypad
  - 2. Door contacts
- B. Access (room) control
  - 1. Card reader
    - a. Reader only
      - 1) Ability to cancel user's access
      - 2) Identification of users accessing area
    - b. Reader with keypad requiring entry of personal identification number (PIN)
      - [] Eliminates use of card if lost
    - c. Card access system
      - 1) Complete system including card readers, microcomputer, security management software, printer, card encoder, and distributed processing modules
      - 2) Vendor
        - [] Kidde Automated Systems
  - 2. Fingerprint reader
    - a. Requires "personal" identification of user
    - b. Eliminates security compromise due to loss of security card and/or compromise of PIN
    - c. Potential vendors
      - [] Fingermatrix, Inc.

C. Space (room, hall, etc.) protection
1. Passive infrared
[] Ceiling or wall-mounted circuit designed to detect movement
2. Glass breakage detector
Ceiling or wall-mounted audio discriminator circuit designed to detect common sound of shattering glass
3. Video monitoring
a. Time-lapse video recorder
1) Provides 24-hour recording of area(s) being monitored
2) Vendor
[] Panasonic
4. Digital video compressor
a. Combines multiple (up to four) cameras into one video signal for displaying, transmission, or recording
b. Vendor
[] Robot Research, Inc.
5. Noise monitoring
6. Relationship between card reader for access and card reader for space protection
[] May require use of two separate card readers
1) to grant access through door, and
2) to deactivate infrared or sound detectors in a room

D. Item (computer, disk, book, etc.) control
1. Rf-based system
a. Non-magnetic system which can be used with magnetic media without rising loss of data/information
b. Rf detectors (sensing antennae) placed at entry\exit point(s)
c. Size of detection tags permits placement on small items, such as 3.5" diskette and cassette tapes
d. Detection tags can also serve as bar code labels
e. Vendors
[] Check/point Systems, Inc.

E. Data access
1. Fingerprint reader offers alternative to passwords for accessing computer files, servers, etc.
2. Vendors
[] Fingermatrix, Inc.

F. Uninterruptible power system for security systems
[] Recommended for any security system to ensure that a power failure will not render the system useless.

G. Security system design and installation

[] Electronic Contracting & Design, Inc.
316 South 52nd Street
Suite 106
Tempe, AZ 85281
(602) 829-9655
Attn: Lucy Getgen, General Manager

GUIDELINE E: ENTRANCE FACILITIES

Entrance facilities are defined as the cabling provided by USWest Communications to connect the on-site interbuilding wiring to the local exchange. Entrance facility size should be based upon an estimate of total voice/data needs anticipated when the college is fully built and equipped. Conduit will be sized accordingly.

Routing of entrance facilities to the MDF will be engineered by USWest Communications for approval by the district telecommunications department.

GUIDELINE F: OUTSIDE PLANT CONDUITS

For the purposes of this document, outside plant is defined as the interbuilding cabling used for voice and data communications (twisted pair), broadband, and Ethernet. The following guidelines should be observed.

Underground Cable

Cable being installed in conduit shall be handled with care and protected from being kinked. A kink is defined, for purposes of this document, as violation of the manufacturer's specified Minimum Bend Radius for each type cable involved. Cable shall not be formed to cause the outside sheath to wrinkle. Unsheathed cable shall not be left exposed to the elements. Cable will be unrolled from the shipping spool and not allowed to spill from the side of the spool.

Manholes

The standard size for manholes used with major underground conduit structures of five ducts or more will be 6' wide x 12' long x 7' high; pullboxes with minimum dimensions of 4' wide x 5' long x 4' high may be used instead of manholes for major conduit structures of four ducts or less.

Conduit Size

Conduits for outside plant cabling will be sized proportionately to the size of the cable required to feed individual buildings. At a minimum, there shall be one (1) 4" conduit for telecommunications wiring (twisted pair), one (1) 4" conduit for video wiring (coaxial cable) one (1) 4" conduit for data communications (Ethernet fiber or coax), and one (1) 4" conduit for spare.

GUIDELINE G: CONDUITS WITHIN BUILDINGS

Conduit structures must be provided for all voice/data/video cabling within buildings. The dual voice/data jack requires three-quarter inch (3/4") conduit. The Video cabling requires one-inch (1") conduit. Additional three-quarter inch (3/4") conduit may be required for data-only and/or LAN jacks. Sizing of conduit should be done in conjunction with the Maricopa Community College District Office Information Technologies Services Department.

APPENDIX A
PIN OUTS/CONNECTORS/TERMINATION DEVICES

DATA ADAPTER CONFIGURATIONS

Macintosh 128, 512
Male DB-9

Signal	DB-9
TXD	5
RXD	9
GND	3
DTR	6

DATA ADAPTER CONFIGURATIONS	
Macintosh Plus, SE, II Circular-8	
Signal	Circular-8
TXD	3
RXD	5
GND	4
DTR	1

PUNCH BLOCK CONFIGURATION			
Signal	Punch Down	Cross-connect Color	Signal Name
TXD	1	Red/Blue	Transmit Data
RXD	2	Blue/Red	Receive Data
GND	3	Red/Orange	Signal Ground
DTR	4	Orange/Red	Data Terminal Ready
RI	5 - If modem	White/Blue	Ringer
Apple Talk	5 - If Apple Talk	White/Blue	
CD	6 - If modem	Blue/White	Carrier Detect
Apple Talk	6 - If Apple Talk	Blue/White	

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TERMINAL SERVER
RSA8 PIN OUTS

Signal	RSA8	RJ11	Signal Name
RI	22	1	Ringer
GND	7	2	Signal Ground
TXD	2	3	Transmit Data
RXD	3	4	Receive Data
DTR	20	5	Data Terminal Ready
CD	8	6	Carrier Detect

DATA ADAPTER CONFIGURATION

Data
DTX
00
1# - Error Check (DTR)
1# - Auto Answer
1# - Out-going modem
Data

APPENDIX B
GLOSSARY

Amplifier - A device which increases the power or amplitude of an electrical signal. Amplifiers are placed where needed in a cable system to strengthen signals weakened by cable and component attenuation. Two-way, single-cable systems use a forward and a reverse amplifier inside one enclosure to boost signals travelling in both directions.

Backbone wiring - The backbone wiring system is also recommended to be topologically arranged in a star configuration whether within a building or across a campus. The topology shall use a maximum of two levels of cross-connects (main and intermediate). Interconnection between two telecommunications closets shall pass through a maximum of three cross-connects (intermediate-main-intermediate). Only a single cross-connect shall be passed through to reach a main cross-connect. Telecommunications closets may be wired directly together.

The cables recognized in the backbone wiring are:
- [] 100-ohm UTP cable.
- [] 150-ohm STP cable.
- [] 50-ohm coaxial cable.
- [] 62.5/125 um optical fiber cable.

The distances for the topologies are the same across all media for the telecommunications closet to the intermediate cross-connect, 500 m (1640 ft) maximum. They vary for the distance from the intermediate cross-connect to the main cross-connect due to performance.

Balancing - Adjusting the gains and losses in each path of a system to achieve equal signal levels (usually to within 3dB) at all user outlets. A balanced network also provides near equal input signal levels to the headend from transmitters connected anywhere in the network.

Bandwidth - The frequency range that a component, circuit, or system can pass. For example, voice transmission by telephone requires a bandwidth of about 3000 Hertz (3 kHz). A television channel occupies a bandwidth of 6 million Hertz (6 MXz). Cable systems occupy 5 MHz to 300 or 400 MHz of the electromagnetic spectrum.

Branch - An intermediate cable distribution line in a broadband coaxial network that either feeds or is fed from a main trunk. Also called a feeder.

Cable Loss - The amount of RF signal attenuation by a given coaxial cable. Cable attenuation is mainly a function of signal frequency and cable length. Cables attenuate higher frequency signals more than lower frequency signals according to a logarithmic function. Cable losses are usually calculated and specified for the highest frequency carried (greatest loss) on the cable.

Cable Powering - Supplying operating power to active CATV equipment (for example, amplifiers) with the coaxial cable. This ac or dc power does not interfere with the RF information signal.

Cable TV - Previously called Community Antenna Television (CATV) . A communication system which simultaneously distributes several different channels of broadcast programs and other information to customers via a coaxial cable.

Cascade - The number of amplifiers connected in series in a trunk system.

Coaxial Cable - A single cable with two conductors having a common longitudinal axis. The center conductor carries information signals; the outer conductor (shield) is grounded for those signal frequencies to prevent interference. This shield is often made of a flexible foil or braid, or solid aluminum. The two conductors are separated by an insulating dielectric.

Cross Modulation - A form of signal distortion in which modulation from one or more RF carrier(s) is imposed on another carrier.

dB - Decibel.

Directional Coupler - A passive device used in cable systems to divide and combine RF signals. It has at least three connections: trunk in, trunk out, and tap. The trunk signal passes between trunk in and trunk out lines with little loss. A portion of the signal applied to the trunk in line passes to the tap line, in order to connect branches or outlets to the trunk. A signal applied to the tap line is attenuated and passes to the trunk in line, and is isolated from trunk out line. A signal applied to the trunk out line passes to the trunk in line, and is isolated from the tap line. Some devices provide more than one tap output line (Multi-taps).

Distribution Amplifier - A high gain amplifier used to increase RF signal levels to overcome cable and flat losses encountered in signal distribution.

Drop Cable - A flexible coaxial cable which connects a network tap to a user's outlet connector. Also called Drop Line.

Entrance facilities - The entrance facilities are where the intrabuilding backbone meets the local exchange carriers or interbuilding wiring within the building.

Equalization - A technique used to modify the frequency response of an amplifier or network to compensate for distortions in the communication channel. The ideal result is a flat overall response. This slope compensation is often done by a module within an amplifier enclosure.

Equipment room - The equipment room is an area within a building where major components of large voice or data communications systems are housed. Equipment rooms are distinct from telecommunications closets due to the nature or complexity of equipment they contain.

F Connector - A standard, low cost, 75-ohm connector used by the CATV industry to connect coaxial cable to equipment.

Filter - A circuit that selects one or more components of a signal depending on their frequency. Used in trunk and feeder lines for special cable services such as two-way operation.

Flat Loss - Equal signal loss across the system's entire bandwidth, such as that caused by attenuators.

Flooded Cable - A special coaxial CATV cable containing a corrosion resistant gell between the outer aluminum sheath and the outer jacket. The gell flows into imperfections in the aluminum to prevent corrosion in high moisture areas.

Forward Direction - The direction of signal flow in a cable system that is away from the CRF or headend.

Frequency - The number of times a periodic signal repeats itself in a unit of time, usually one second. One Hertz (Hz) is one cycle per second. One kilohertz (kHz) is one thousand cycles per second.

Headend - The facility that contains a cable system's electronic control center, generally the antenna site of a CATV system. It usually includes antennas, preamplifiers, frequency converters, demodulators, modulators, and other related equipment which receive, amplify, filter and convert broadcast television signals to cable system channels. It might house a host computer in broadband data communication systems. In two-way broadband systems, the headend holds at least the frequency translator.

High Frequencies - Frequencies allocated for transmission in the forward direction in a midsplit broadband system, approximately 160 to 400 MHz.

Highsplit - A frequency division scheme that allows two-way traffic on a single cable. Reverse path signals come to the headend between 5-174 MHz; forward path signals go from the headend between 232-400 MHz. No signals are present between 174-232 MHz.

Horizontal wiring - The horizontal wiring is the wiring between the telecommunications closet and the telecommunications outlet.

Horizontal wiring - The horizontal wiring organization as defined by this project is a "star" topology. This means that every office outlet shall be connected to a telecommunications closet. Most systems today can accommodate this type of structure. Current implementations of IEEE802.3/Ethernet (a "bus" structure) and 802.5/Token Ring (a "ring" structure) have been designed to handle star wiring through concentrators or multiport devices.

The distances in the horizontal wiring are defined to be 90 m (295 ft) with an allowance in the work area for an additional 3 m (9.8 ft).

The cables that are recognized in the horizontal wiring are:
[] 4-pair 100-ohm unshielded twisted pair (UTP) cable.
[] 2-pair 150-ohm shielded twisted pair (STP) cable.
[] 50-ohm coaxial cable (thin coax).

In choosing a medium for use in horizontal wiring the following recommendations are made.

There shall be a minimum of two telecommunications outlets at each work area location. These telecommunications outlets are defined as follows:

- [] An outlet which shall be supported by 4-pair 100-ohm UTP cabling.
- [] Another outlet which shall be supported by one of the following horizontal media:
  - () 4-pair 100-ohm UTP cable;
  - () 2-pair 100-ohm STP cable;
  - () 50-ohm coaxial cable.

These recommendations are made with the intent of accommodating a diversity of user applications in order to reduce or eliminate the probability of requiring changes to horizontal wiring to meet future needs.

Insertion Loss - The loss of signal level in a cable path caused by insertion of a passive device. Also called Thru Loss.

Interbuilding backbone - This is the same as the intrabuilding backbone except it goes between buildings through the entrance facility. There are other special considerations for the building-to-building wiring due to environmental and distance specifications.

Intermediate cross-connect - This is the same as the main cross-connect except it is a level lower in the hierarchy of backbone wiring.

Intrabuilding backbone - The intrabuilding backbone Consists of the transmission media, cross connects and terminations for interconnecting telecommunications closets, equipment rooms and network interfaces.

Isolation Loss - The amount of signal attenuation of a passive device from output port to tap outlet port.

Low Frequencies - Frequencies allocated for transmission in the return direction in a midsplit broadband system, approximately 5 MHz to 116 MHz.

Main cross-connect - Where wiring systems join together, there need to be some interconnecting scheme. This is defined as a cross-connect. The cross-connect is the top level in the hierarchy of the building wiring. Termination and patching are the functions performed by the cross-connect.

Midsplit - A frequency division scheme that allows two-way traffic on a single cable. Reverse path signals come to the headend between 5-116 MHz; forward path signals go from the headend between 168-400 MHz. No signals are present between 116-168 MHz.

Modem - A modulator-demodulator device. The modulator codes digital information onto an analog carrier signal by varying the amplitude, frequency, or phase of that carrier. The demodulator extracts digital information from a similarly modified carrier. It allows communication to occur between a digital device (for example, a terminal or a computer) and an analog transmission channel, such as a telephone voice line.

Multi-tap - A passive distribution component composed of a directional coupler and a splitter with two or more output connections. See Tap.

Network interface - The network interface is the point of connection between the local exchange carriers equipment/wiring and the intrabuilding wiring/network.

Noise - Any undesired signal in a communication system.

Pad - A passive attenuation device used to reduce a signal's amplitude.

Return Loss - A measure of the degree of impedance mismatch for an RF component or system. At the location of an impedance mismatch, part of the incident signal is reflected back toward its source, creating a reflected signal. The return loss is the number of decibels that the reflected signal is below the incident signal.

Return Path - Reverse direction; towards the headend.

Signal Level - The RMS voltage measured at the peak of the RF signal. It is usually expressed in microvolts referred to an impedance of 75 ohms or in dBmV.

Slope - The difference between signal levels at the highest frequency and at the lowest frequency in a cable system. Also called spectrum tilt.

Slope Compensation - The action of a slope-compensated gain control. The gain of the amplifier and the slope of amplifier equalization are changed simultaneously to provide equalization for different lengths of cable; normally specified in terms of cable loss.

Splitter - A passive device that divides the input signal power from the forward direction into two or more output signals of less signal power. Input signals from the reverse direction are combined into a single signal and passed toward the headend. Splitters pass through 60 Hz power to all lines.

Station equipment - Station equipment resides in the work. This could be terminals, PCs, Systems or monitoring equipment.

Surge Arrestor - A device that protects electronic equipment against surge voltage and transient signals on trunk and distribution lines.

Tap - A passive device, normally installed in line with a feeder cable. It removes a portion of the signal power from the distribution line and delivers it to the drop line. The amount of power tapped off the main line depends on the input power to the tap and the attenuation value of the tap. Only the information signal (and not 60 Hz power) goes to the outlet ports. See also Multi-tap.

Tap Outlet - A type F connector port on a tap used to attach a drop cable. The information signal is carried through this port. The number of outlets on a tap usually varies from two to eight.

Telecommunications closets - The telecommunications closet is the area defined within a building to connect the intrabuilding backbone to the horizontal wiring. It can contain cross-connects, terminations and active or passive equipment to support the customer needs for telecommunications services.

Telecommunications outlets - The telecommunications outlets are the interconnection points between the horizontal wiring and the work area.

Termination - A 75-ohm resistor that terminates the end of a cable or an unused tap port with its characteristic impedance to minimize reflections.

Trunk Amplifier - A low distortion amplifier that amplifies RF Signals for long distance transport.

Trunk Cable - Coaxial cable used for distribution of RF signals over long distances throughout a cable system. Usually the largest cable used in the system.

Work area - The work area is defined as the location of the station equipment and work area wiring up to the telecommunications outlet. The work area wiring is nonpermanent and has special considerations in management.

*(All information from) -
Broadband Network Technology by Edward Cooper, Prentice - Hall,
1986 Englewood Cliffs, New Jersey.

APPENDIX C
SPECIFICATION CHECKLIST

This excerpt from the BICSI Telecommunications Distribution Methods Manual contains a checklist of specifications telecom designers can use to inform a construction contractor in detail of the methods and materials their plans require.....

PLEASE NOTE: OUR EFFORTS TO SCAN THIS DOCUMENT WERE NOT SUCCESSFUL. WE WILL TRY TO OBTAIN A MORE LUCID COPY OF THE DOCUMENT, AND WILL PROVIDE A COPY OF THIS DOCUMENT WHEN IT HAS BEEN SUCCESSFULLY SCANNED.

APPENDIX D
Members
Ocotillo Research/Action Committee
on
Technical Standards

Jan Baltzer	District
Lionel Diaz	District
Gilbert Gonzales	Chandler/Gilbert CC
Manny Griego, Chairperson	Glendale CC
KC Hundere	District
James Jacob	Estrella Mountain CC
Don Shehi	District
Bill Snyder	District
David Waters	District

Support for Technologies

by **Betsy Hertzler, Chair - MCC**
Jamie Cavalier, Coordinator - District
Lionel Martinez, Coordinator - District

BACKGROUND:

This is a continuation of last year's "Staying Current with Technological Change: Implications for Internal Traning and Development" group, better known as the training group. The issues of preparing people to use technology and of supporting users is a major concern. It was a major theme in the 1986 Master Plan for Instructional Computing.

CHARGE:

This group will focus on the issues of training of faculty and staff in the newer technologies and the continuing support needs of those who use technology.

Group Participants
Jean Ann Abel, GCC
Al Battle, PC
Cindy Cloud, PVCCC
Elaine Erickson, GCC
Gary Filan, DIST
Kathy Green, PC
Susan High, GCC
Margaret Hogan, CGCCC
Norman Johansen, MCC
Edward Kelty, RSCC
Barbara Kilpatrick, MCC
Deborah Krumtinger, DIST
Patti Marsh, PC
Kathie May, DIST
Arneida Miller, MCC
Ned Miner, PC
Brenda Nielsen, DIST
Karen Schwalm, GCC
Charles Sessions, SCC
Ginny Stahl, SCC
Jill Suydam, GCC
Richard Walker, DIST
Roger Yohe, MCC

We met for the first time on September 25, 1989, and generated a list of concerns and areas of discussion which would become our agenda for the remainder of the year:

Need incentive or reward ($) for sharing expertise.

1. Stay current: training for equipment /systems, both initial and followup.
2. Training faculty to use technology in the classroom, for example Datashow.
3. Need resource/reference people or class (preferably on campus).
4. Need incentive or reward ($) for sharing expertise.
5. One-on-one followup for training.
6. Need to include part-time/evening faculty.
7. Well-developed, user-friendly materials.
8. Coordination of training materials for faculty, staff, and students.
9. Faculty user group on developing software use.
10. Interactive video.
11. Center for Innovation support at each college and the District Office. What should the Center look like - physically; in terms of staffing; and in terms of equipment?
12. What equipment should we choose for our classrooms?
13. How do we upgrade what we have?
14. Where are the answers?
15. We need a mechanism/vehicle to determine what we (faculty) want.
16. District purchasing is used for equipment answers.
17. Liaison.
18. Vendors - who is giving us the best information.

As we met through the year we discussed what was already happening at our respective campuses and at district regarding these topics. Along we also introduced the notion of using the Concerns Based Adoption Model (CBAM) as a point of reference for technology change and noticed that many of the issues/concerns fit into the stages of concern postulated by the model. We were ably assisted in our discussion about CBAM by Margaret Hogan and the research she had done with district faculty regarding their use of computers. We saw from her findings that most faculty reported at the time that they used computers primarily as word processors.

Another result of our dialogues was that we deleted some of the original items on the list because they were no longer of concern or were being addressed in other ways. These items were (#7) well-developed, user-friendly materials and (#16) district purchasing is used for equipment answers. We were left with the following list of suggestions/concerns for the 90-91 academic year:

1. Part-time faculty
    a. Consistent and timely training/orientation of part-time faculty
    b. Adequate space and facilities for computer training of part-time faculty.
    c. Accurate list of part-time faculty to insure that everyone is contacted for training.
    d. Pay for part-time faculty to attend computer training and other professional growth opportunities.
    e. Needs assessment of part-time faculty.

2. Campus software support groups
    a. Needs assessment
    b. Create a mechanism to share information such as users groups and Dr. Mac.

3. Vendors

4. Change facilitator/liaison
    a. Each campus should have one person designated to take people who need technology training from where they are to a comfort level of some kind. This person would not necessarily provide the training him/herself, but would coordinate it. This person could help ensure consistency in training, and provide follow up and ongoing support as new users hit frustration levels. This person could also be available to help department/division chairs create "custom" training programs.
    b. Change facilitators could be identified as the campus clearing house for training and other technology needs and services, and thus provide the liaison position cited.
    c. Have CBAM training broadly available on each campus (and we requested that a presentation be made at the district convocation in January).

5. Incentive or reward for sharing
    a. Release or reassigned time should be adequate to the task taken on.
    b. Include part-time faculty as resource people to share expertise.
    c. Department/division chairs were recommended as the body to set guidelines for incentives.

Training should be more than just the initial introduction.

6. Ongoing support for specialized technology
    a. Training should be more than just the initial introduction. Specialized technologies require adequate equipment, software, and after-training support in order for faculty to use them in a meaningful way.
    b. Establish closer links with ITS for purposes of satellite downlinks and videoconferencing for training purposes.
    c. When specialized technology or upgrades are introduced, coordination and two-way communication with all the potential players needs to be established.

Specialized technologies require adequate equipment, software, and after-training support in order for faculty to use them in a meaningful way.

7. Coordination of training
    a. Staff development coordinators on each campus need to be involved.
    b. Share responsibilities for training.
    c. Training resources should be adequate.
    d. Explore the training of whole departments at once.
    e. Need for on-site expertise.

In addition to shaping the list of issues we wanted to bequeath to the Ocotillo group, we shared some of the things which are already being done on the campuses. GCC has created a Faculty Innovation Support Committee (FISC) which includes faculty and staff with assigned responsibilites. They distribute a monthly calendar (on readily recognizable paper) outlining all the training opportunities to both full- and part-time faculty. Further they have one committee member (Elaine Erickson) who is responsible for internal and external grants, student retention, At-Risk program, institutional research, and special projects. Another committee member (Susan High) handles faculty and staff training (includes technical training, workshops, one-on-one user support , and troubleshooting). They are already addressing some of the items mentioned in our report. MCC is handling faculty computer training through the Center for Innovation. Jim Ferguson (faculty) helps a faculty member select an appropriate computer/terminal and then coordinates the training for that equipment. The Center also provides ongoing support after the initial training. Other campuses provide computer/technology training in a variety of ways.

This report would not be complete without kudos to several committee members who were there to contribute throughout the year (knowing that some of the original groups had other time commitments which prevented them from continuing). These people are: Karen Schwalm (GCC), Susan High (GCC), Elaine Erickson (GCC), Bud Sessions (SCC), Barbara Kilpatrick (MCC), and Debbie Krumtinger (DO).

EDITORS' NOTE:
The following is the draft of a proposal submitted by GCC and District Training Services. We've included it as part of the 1989-90 Ocotillo Report because it articulates one approach to meeting training needs at the colleges. While this proposal is not a formal recommendation of the Support for Technologies group, we hope it serves to spark some ideas.

GLENDALE COMMUNITY COLLEGE

and

MCCCD TRAINING SERVICES

DRAFT

PROPOSAL

for

The Establishment of

REGIONAL TRAINING FACILITIES

Introduction

Glendale Community College and the Office of Training Services and Innovation Center have, in a cooperative effort over the past ten months, established a partnership training service at Glendale Community College. GCC and Training Services invite all MCCCD colleges and educational centers to participate in this model project and establish **Regional Training Facilities** within their own colleges.

Regional Training Facilities are proposed for the purpose of jointly offering a comprehensive technology training program to all employees of the Maricopa Community College District through the most beneficial and cost-effective means possible. Continual training, retraining, and post-training support are critical in keeping faculty, administrators, and staff abreast of technological changes. The establishment of regional training facilities will empower the district to effectively meet training needs.

In support of this proposal, GCC and Training Services are willing to commit to jointly funding an Educational Computers Systems Trainer position to begin July 1, 1990 and go through June 30, 1991. The ECS Trainer position is a pilot position and program to be located at GCC.

This proposal addresses in detail various aspects of this pilot program.

Background

Ocotillo

The need to address the technological impact and changes within MCCCD is evidenced by the development and subsequent growth of the Ocotillo Committee. Since 1988, various Ocotillo subcommittees have been hard at work addressing the many issues of managing technology. Specifically the *Strategies for Training and Support* subcommittee made the following 17 recommendations at Ocotillo Retreat '89:

1. Release time for faculty to keep current with state of the art technology
2. An Innovation and/or Resource Center/concept at each college to allow training for all faculty; get assistance on software, hardware, etc. on a continuous basis; to have structured classes, small group instruction, or one-on-one instruction. The center would also have curriculum development help.
3. Train trainers
4. Develop a District Director of "experts" who know specific software (Hypertext)
5. The "experts" (experts by area or by discipline) should receive reimbursement, (i.e. different loading and/or reassigned time) to assist faculty to develop technology in their field. These experts will also be available for phone assistance.
6. Innovation/resource center needs to be adequately staffed, i.e. full-time technician who can be resource for faculty.
7. Budget for supplies, staff, phone, software, telecommunications for certain training.
8. Professional Growth Committee - change in policy regarding faculty learning and keeping current with software (on their own). The policy must incorporate flexibility.
9. Flexible use of accountability to encourage faculty to use technology outside their office, e.g. for curriculum development training through technology. Campuses need to provide necessary equipment.
10. Orientation for new faculty to "check out" their knowledge on A1 mail, telephone systems, word processing, etc.

11. Orientation for part-time faculty to familiarize them with resources (technology) available
12. Part-time faculty should have opportunities to complete special projects.
13. Training for computer literacy (other than A1).
14. Bring in special presentations (like videoconferencing) and make them available.
15. District Training Services needs to provide well-written manuals.
16. Have district training services do a pilot project on specified areas (such as authoring languages).
17. District needs to maintain and update database ("experts", coursework, finished projects by all faulty, etc.)

The Ocotillo Subcommittee *Support for Technologies* is continuing to explore solutions to the problems of providing training support.

Pilot Training Program At Glendale Community College

At the beginning of the 1989-90 academic year, Susan High, from Glendale Community College, was approved for a VISIONS proposal entitled *GCC Training Services Partnership* (see appendix). Under the guidance of Charles West from GCC's Innovation Center and Jamie Cavalier, from Training Services, this pilot program has provided extensive training opportunities for the faculty and staff at GCC. Training demands at GCC continue to increase as more people become aware of the training and support resources available. Additionally, many of the training sessions at GCC have been open to all MCCCD faculty and staff, and people from several other Colleges have taken advantage of these opportunities (see appendix).

Glendale Community College and Training Services invite all MCCCD Colleges and Educational Centers to establish a partnership training service based on the model implemented at GCC. With the establishment of additional Regional Training Facilities (RTF's), technical training support and services would be increased for all faculty and staff.

Training Needs

Training needs within MCCCD fall within two broad categories: those needs that are consistent district-wide and those that are college specific.

District-wide Training Needs.

District-wide training needs include training on administrative systems such as ALL-In-1, Schedule Allocations and Monitoring (SAM), Financial Records System (FRS), and Dterm V telephones. Additional district-wide training needs include desktop personal computer systems and software such as Macintosh and IBM (and compatibles). Regional Training Facilities, working in cooperation with District Training Services, would be prepared to support these systems.

Training Services will continue to be the "core" of training by providing Train-the-Trainer programs and authoring training materials for systems and software supported within the district. The *Ocotillo Retreat '89 Reports* indicate there is an increasing need for technological training support. The establishment of Regional Training Facilities at additional colleges and educational centers would improve significantly technological support within MCCCD.

College-Specific Training Needs.

The pilot program at GCC has proven there are many advantages to having site-based trainers. Trainers at colleges are better positioned to respond quickly and effectively to specific training and technological support needs at individual colleges. Site-based trainers know the faculty and administrators on a personal basis and are better positioned to respond to unique, individualized training needs. They provide a comfort zone that a centrally located facility cannot readily provide. Needs assessment is more accurate and personal. Site-based trainers are more readily available for immediate and follow-up assistance. There is more personal contact, which helps alleviate the stress and frustration that rapidly changing technology can create.

The **Electronic Forum**, recently developed by Karen Schwalm and Chris Zagar, is one faculty project supported by the GCC training program/Innovation Center. The Electronic Journals (part of the Electronic Forum) are a vehicle for implementing writing into the curriculum. The journals provide an opportunity for students to write for an audience outside the formal classroom, under a pen name that protects privacy and allows freedom to express ideas. There has been tremendous interest in this program from faculty members in various disciplines at GCC and other colleges. The innovation Center staff are working with Karen and Chris to coordinate workshops and provide technical support for the Electronic Journals. Other custom workshops and one-on-one training can be implemented by RTF's to meet the unique, diverse needs of the colleges.

Training Services would provide full support to trainers at the RTF's and would keep them updated on the latest techniques. Trainers at RTF's would support the district-wide training effort and share their expertise. Training Services and the RTF's would coordinate activities to ensure that highest quality support and service be maintained.

The establishment of additional Regional Training Facilities will provide an infrastructure that will benefit everyone within MCCCD.

Benefits

Accessibility

Immediate access to trainers and training resources for individualized instruction

On-site assistance for immediate trouble shooting and follow-up

On-site facilities for immediate access to hardware and software

Training available at faculties'/employees' convenience

Reduced Cost

Travel to the district office reduced and college vehicles released for other uses

"Down time" due to technical problems reduced, thereby increasing productivity

Productivity and job satisfaction are improved by continual training opportunities and support

Sharing of documentation/training materials eliminating duplication of effort and maximizing existing and future resources

Enhanced communication and sharing of information, increasing the quality of hardware and software purchasing decisions

Joint efforts of District and colleges to secure outside monies (grants, seed money, etc.) to continue to provide state-of-the-art support

Joint Planning Efforts

Future district-wide training needs more accurately assessed with structured sharing of information/ resources

Opportunity for employees to receive training and training support better ensures the opportunity for use of technology in the classroom and encourages innovation.

Accurate Training Needs Analysis

College-based trainers are the most familiar with the unique training needs of individual colleges' faculty, administrators, and staff. They are the first contact with individuals.

College-based trainers have established working relationships with faculty. The need for training and support can be more accurately identified by RTF trainers.

Consistency

Consistency in course content and use of materials will increase and enhance training opportunities for all employees and reduce cost. Quality of instruction and standards of materials can be maintained.

Quality

Employees participate more readily in on-site training opportunities.
Sharing of training techniques and materials enhances quality.
Trainers receive use of software and instruction on presentation techniques.
Increased opportunity for effective followup.

Additional Resources for District-wide Training Program

Trainers from the RTF's are available to support district-wide training programs and provide backup support.

Training Objectives

I. Provide computer software, hardware, and telecommunications training and post-training support at Regional Training Facilities and Training Services (TS) and for all MCCCD employees.

   a. Provide readily accessible training opportunities and support

b. **Conduct continuous needs analysis to identify training requirements**

c. **Assist with software and hardware purchasing decisions**

d. **Ensure consistency of course content and training materials**

e. **Develop custom training to meet individual, departmental, and/or college needs**

f. **Reduce costs of the training program**

g. **Maintain flexibility in scheduling to accommodate busy schedules**

II. **Provide computer software, hardware and technical support targeted to address the unique and diverse college needs by providing**

a. **custom workshops**

b. **one-on-one training sessions**

c. **immediate, personal response to "trouble" calls.**

d. **personal follow-up**

III. **Provide appropriate human resource development training and post-training support to all MCCCD employees.**

IV. **Reduce training-related expenses for trainers and participants**

Operational Cooperation

1. **Regional Training Facilities and Training Services offer a comprehensive set of courses to all MCCCD employees.**

2. **Regional Training Facilities and Training Services jointly expand the utilization of technology for instructional support (MCCCD Strategic Goal #6) and foster the development of innovative technological applications for classroom use.**

3. **Regional Training Facilities and Training Services will jointly identify training needs of employees and determine what software and hardware will be supported to ensure cost effective training methods and help set standards.**

4. **Documentation and other materials developed by TS and Regional Training Facilities (such as look-up guides, manuals, presentation materials) will be available to all trainers and shared among all employees.**

5. **Regional Training Facilities will negotiate training sessions and register participants.**

6. **Regional Training Facilities and Training Services will work jointly to set the criteria in the selection of future TS and college-based trainers.**

7. **To ensure consistency in the district-wide program, TS will provide "Train-the-Trainer" classes and update training classes for college-based trainers.**

8. **Trainers from Regional Training Facilities will serve as resource persons for all MCCCD employees and will provide back-up assistance as possible and practical.**

9. Regional Training Facilities and Training Services agree to work together any/all ways possible for the common instructional, training, and financial benefit of the MCCCD (i.e. purchasing decisions, grant money, etc.).

10. In support of this proposal, GCC and Training Services are willing to commit to jointly funding an Educational Computers Systems Trainer position to begin July 1, 1990 through June 30, 1991. The ECS Trainer position is a pilot position and program to be located at GCC in support of this proposal.

Summary

This proposal supports MCCCD Strategic Planning Goal #6: Expand the utilization of technology for instructional support. Information technology and computing applications continue to expand at a tremendous pace in the Maricopa Community College District, impacting all levels and facets of the organization. There is a need for training support for personal computers systems, administrative systems (including ALL-In-1; Scheduling, Allocations, and Monitoring (SAM); Financial Records System (FRS); and telephones.) Future administrative systems that will require support include MAPS and Inform. Designated trainers at the college sites (and/or educational centers), in cooperation with MCCCD Training Services, will meet the increased and diverse training demands of each college and provide additional support to the district-wide training program.

Teaching and Learning

by **Billie Hughes, Co-Chair - District**
Marti McCorkindale, Co-Chair - District

BACKGROUND:

This was an important area of discussion that came out of Technology Retreat '88. Teaching and learning was, in fact, the central theme of that retreat and has become the central theme of Ocotillo. We anticipate that this theme will continue long into the future as we try to determine the best ways to use technology to improve learning.

CHARGE:

Current issues in teaching and learning are so diverse and pervasive that Ocotillo will use a multi-pronged approach.

1. Ocotillo will help initiate and support college-based groups wishing to explore the area of teaching and learning.
2. Ocotillo will sponsor discipline dialogues, targeting one or more major discipline areas during 1989-90.
3. Ocotillo will support topic-based discussions following selected Lodestaror similar events.

Group Participants

Julie Bertch, RSCC
Gordon Jesse, CGCCC
Sally Jesse, CGCCC
Wanda Matthews, CGCCC

Background

During the 1988-89 academic year, The Technology, Learning Theory, and Curriculum Restructuring Group chaired by Rio Salado Community College English instructor, Julie Bertch, and coordinated by district instructional designer, Billie Hughes, conducted several meetings and teleconferences. While the group found neither firm answers to how technology was presently affecting student learning nor a clear vision of how student learning would be affected in the future, their journey of analysis and rethinking led them to express the need for educators to question teaching processes that have become automatic and to delve into teacher and learner roles. They expressed concern about whether technology integration should be considered a goal in itself or merely one tool that might be used by instructors to help students attain their educational goals, and they emphasized the importance of examining the very process of how change occurs.

analysis and rethinking led them to express the need for educators to question teaching processes that have become automatic and to delve into teacher and learner roles.

The final report of the 1988-89 group posed the following questions members felt must be addressed as Maricopa strives to meet faculty and student needs in our emerging technological environment:

1. How might technologies affect the ways courses are put together—reorganizing information, blurring discipline distinctions, providing alternative modes of presentation?
2. How might technologies change the teaching environment—time, place, schedule, teacher/student interactions, student/student interactions?

These two guiding questions suggested areas of exploration specific to the instructor's role:

1. What skills and/or knowledge would an instructor need to use these technologies?
2. How can an instructor best become and remain current in these technologies?
3. How can instructors share expertise about technologies?
4. How can instructors be encouraged to create innovative uses of technology?

Questions concerning student learning also emerged from the guiding questions:

1. How could technologies provide alternative ways of learning?
2. How could technologies make students more independent learners?
3. How might technologies provide the means and the impetus for integrating discrete learning into more meaningful concepts?
4. How might technologies affect the approaches and the processes students use in learning—the way they deal with information?

In the final report, Bertch and Hughes also commented that we need to develop processes and support systems that help faculty adopt and adapt new technologies for their classrooms. They went on to suggest that many of the changes we need to consider are unknowns; that is, the change *per se* has not been defined. Thus, we also need processes to support faculty in the exploration and development of new approaches, probably at the college/center level. Implementing innovations in Maricopa has two components: 1) support systems for the dissemination and adoption of new approaches that others are using successfully, and 2) systems that support faculty exploring new ways to teach—those who are cutting-edge innovators rethinking the roles of teachers, students, and the traditions of instruction.

we need to develop processes and support systems that help faculty adopt and adapt new technologies for their classrooms.

To support faculty questioning new roles and considering new possibilities, the 1988-89 Technology, Learning Theory, and Curriculum Restructuring Group proposed a four-stage, or -phase, process to enable Maricopa faculty to explore new possibilities, to design pilot projects that integrate new approaches into teaching, to rethink and consider the implications of their work, and to develop ways to share what they are doing with other. The four stages proposed were:

1. **Information/Discovery Opportunities:** Colleges, departments, and disciplines need opportunities; to explore teaching and learning issues of the 90s. Groups from these constituencies would explore changes affecting education, consider innovations, discuss implications, reflect on applications, and consider possibilities. Bertch and Hughes envisioned this stage as recursive, continually providing faculty opportunities for learning, renewal, and instructional leadership. Supporting this exploration with a local focus is essential to change because each college/center has a unique culture suited to its own community and mission.
2. **Exploration and Project Development:** Innovative and creative faculty emerge as leaders when provided opportunities to develop and implement pilot projects that integrate the most promising possibilities. The institutions must ensure our "best" have opportunities to work through "how-to" accomplish what is possible. Following this "how-to" stage, leaders need support to implement, tinker, and reflect on their work.
3. **Rethinking/Strategy Development:** Creativity thrives on introspection and rethinking of projects and ideas. By linking with others we discover the interconnectedness of our work. We need to ensure opportunities for development of strategies for sharing what we have learned.

Creativity thrives on introspection and rethinking of projects and ideas.

4. **Building Communities of Scholars Pursuing the Art and Craft of Teaching:** We need to foster a collegial community that enables ideas to spread and evolve. We need administrative support for our efforts to help create a campus climate that encourages continued questioning and exploring —one that provides support and opportunity— one in which the norm is lively dialogues on teaching and learning.

We need to foster a collegial community that enables ideas to spread and evolve.

The 1989-90 Project

In setting direction for the 1989-90 academic year, the Ocotillo Technology Teaching, Learning Theory, and Curriculum Restructuring Group, now chaired by Billie Hughes and Marti McCorkindale, analyzed the previous group's questions and recommendations (*Ocotillo: Improving Learning through Instruction: Interim Report, 1988-89*, pp. 67-72). After pondering the questions in relationship to MCCCD's overall faculty development activities, we realized that focusing on a tool, technology, to address universal teaching and learning issues made no more sense than asking how the pencil might focus such explorations! When we rephrased the questions with teaching and learning as a focal point, the follow list resulted:

we realized that focusing on a tool, technology, to address universal teaching and learning issues made no more sense than asking how the pencil might focus such explorations!

1. What skills and/or knowledge do instructors need in the 90s?
2. How can instructors best become and remain current?
3. How can instructors share expertise?
4. How can instructors be encouraged to be innovative?
5. How can instructors provide alternative ways of learning?
6. How can instructors provide means and impetus for integrating discrete learning into more meaningful concepts?
7. How might instructors affect the approaches and the processes students use in learning—the way they deal with information?

When we rephrased the questions in more general terms, we could more easily analyze the strengths of the current MCCCD approach to supporting innovation and faculty development and then explore activities that fill in the gaps.

Existing Support Systems

This analysis revealed that we currently have structures and funds to support:

1. Development of new approaches via the internal grants program. For example, an Instructional Computing grant funded Leroy and Holly Beene to develop a hypercard stack on the Vietnam War. Lodestar grants continually provide funding for speakers who introduce new ideas to MCCCD faculty and staff. For instance, Barbara Leigh Smith of Evergreen State College provided faculty with expertise to begin Learning Communities projects.
2. Staff development projects to introduce new trends. Examples include the Classroom Research Project and Instructional Skills Workshops sponsored by the Offices of Staff Development and the Maricopa Center for Learning and Instruction (MCLI).

3. A Staff Development Coordinator at each college and center to facilitate the exchange of information about innovations and provide supportive development activities.

4. Training Services to provide classes on common computer packages and also a short course on the adult learner.

5. Computer Coordinators at the colleges and centers to assist faculty with technical aspects of projects.

6. Hardware and software resources at the MCLI for evaluation and exploration projects.

7. Professional Growth funds to provide opportunities for learning about new trends and to travel to conferences to learn about new projects.

8. Sabbaticals for in-depth investigation of teaching and learning projects.

These support systems and funding sources are essential for learning new skills, remaining current, and for the development of innovative ways to teach. Through them, faculty and staff develop alternative delivery techniques and change the way instruction is delivered. For example, through Instructional Computing Grants, Julie Bertch developed the foundation of her modem course, Don Snow and Mike Morgan are developing computer programs to teach critical thinking skills, and Doyle Burke and Gwen Rowley are now designing an open-entry/open-exit English course.

Our analysis suggests that we are not lacking innovations, but we are lacking ways to bring faculty and staff together to explore common applications. We are not building **teams** at the college level who question current instructional approaches and devise new ways to look at current teaching/learning challenges; and we have not created the little "sanctuaries" at the colleges needed for reflection of broad, cross-disciplinary problems. In short, we have not nurtured miniature think tanks that have the time to reflect and to look at teaching and learning from new perspectives.

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A Three-Pronged Approach

With this analysis as our foundation, this year's Ocotillo Group on Teaching and Learning (OTL) took a three-pronged approach. One thrust was to pilot a Teaching and Technology Change Team at Chandler/Gilbert Community College Center to provide opportunities for information/discovery activities, development and piloting of innovative projects, and the fostering of a community of scholars.

Our intent was to test a model for involving faculty at a college/center in an interdisciplinary team that could examine teaching goals and develop new ideas to try in their classrooms. We wanted to see how the four phases recommended by last year's Ocotillo Group would play out in the dynamic environment that exists at a college/center. (This project is described in more depth in a later section of this paper.)

A second approach was to develop an environment that encouraged the cross-college exchange of ideas among faculty within a discipline. Our analysis of existing support systems indicated that Maricopa lacks such a mechanism for sharing successful innovations and knowledge gained from professional conferences and readings. This aspect is critical to the infusion of innovation because the change literature emphasizes the importance of these peer-to-peer linkages:

> Information about innovations is often sought from near-peers [people very much like ourselves who know a little more about a particular topic than we do], especially information about their subjective evaluation of the innovation. This information exchange about a new idea occurs through a convergence process involving interpersonal networks. The diffusion of innovations, thus, is essentially a social process in which subjectively perceived information about a new idea is communicated (Rogers, E.M., 1983, *Diffusion of Innovation*, p. xix).

In an effort to encourage these critical faculty-to-faculty exchanges, we proposed to pilot three Discipline Dialogues during the year that would bring full- and part-time instructors from across the district together to talk about teaching and learning issues in their discipline and to share innovations faculty were using successfully in their classrooms (These forums are described in depth in a later section of this report.)

The third activity undertaken by OTL was formation of a district-level group of faculty and administrators. A major objective of this component was to provide a monthly forum for all persons interested in exploring the nature of learning and the impact of technology on learning. While a fairly unstructured format was envisioned, we speculated that distributing carefully selected, thought-provoking articles to participants ahead of meetings would be a useful way to stimulate and focus discussions. By providing the articles and demonstrating a discussion model, we hoped to inspire participants to replicate the model with groups at their own colleges and centers. The fourteen people who attended the organizational meeting on September 25, 1989, expressed support for this format.

The first regular meeting of the group was well attended. Participants enthusiastically participated in an expectation-setting exercise and in an activity which allowed them to identify characteristics of good teaching by sharing their own successful classroom experiences.

Despite the success of this first session, the next scheduled meeting was sparsely attended, continuing a trend which had disappointed leaders Julie Bertch and Billie Hughes the previous year. At this point we concluded that, while faculty are vitally interested in exploring teaching and learning issues, a district-wide group is not the preferred vehicle for such discussion. The decision, therefore, was to discontinue the district-level group and concentrate energies instead on the campus-level and Discipline Dialogue components.

Review of Major Activities

The Chandler/Gilbert Community College Center Change Team. The Change Team pilot at CGCCC is a cross-discipline, college-level activity jointly sponsored by CGCCC administration, the Office of Faculty/Staff Development, and the MCLI. The intent of this effort was 1) to develop a college-based team for exploration of teaching and learning possibilities, and 2) to support faculty in the development and implementation of innnovative, technological projects. This pilot, however, has another important component: the linking of those on the Change Team with other colleagues within their departments. For this reason, each member of the Change Team is funded by CGCCC as a division staff developer. That is, they are to involve others in their division in their projects and to share the possibilities they are exploring.

The Change Team began to take form late last spring when Ocotillo leaders approached CGCCC about the possibility of forming a team whose charge was to explore teaching, learning, and technology possibilities; to develop pilot projects based on this exploration; and to involve others in their findings. The CGCCC administration agreed to fund faculty to attend a one-week exploration "seminar" that was planned and facilitated by Marti McCorkindale, Jim Walters, and Billie Hughes. At the end of the seminar, six faculty had built support linkages and begun to formulate plans for how to share their experiences with others at CGCCC and to begin to develop plans for their own projects. These six faculty continued to meet and explore ideas throughout the fall and into the spring.

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Three of the Change Team members have moved their ideas from exploration to proposals and now are using technology in new ways. After several months of effort, Gordon Jesse, Wanda Matthews, and Sally Jesse have developed projects that use technology in creative and innovative ways. Gordon's and Sally's projects will be linked for a Learning Community project, "Technology and the Arts", being planned for fall, 1990.

Gordon Jesse is exploring ways for students to express themselves through images and to study how using images affects student learning. Initially, he is using the ABC InterActive materials as his source of video. He and his students access images stored on videodiscs via a hypercard stack. This visual approach to topic exploration adds a dimension not possible in written materials. He is also incorporating these ABC video clips into his speech classes as a means of teaching critical thinking and analysis of some of the more influential speeches of the last few decades.

Wanda Matthews' project also involves working with the ABC InterActive program as a means to initiate discussion and critical thinking exercises in her reading classes. This approach provides developmental students with unique opportunities to engage in critical thinking activities that are relevant to everyday life.

Sally Jesse is using the MAC II and Micromind Director software as a tool in her choreography class to input video images from class video taping. Eventually this approach will be used to assist students with the acquisition of movement skills. Another aspect of this project involves the creation of a video that integrates the separate segments into a video performance, an alternative to a live production.

These Change Team members have also been active in learning about learning. Sally, Gordon and Wanda were active participant in Ocotillo groups. They took part in CBAM training, participated in the Lodestar forum on "Learning Communities", and they attended the Classroom Research Seminar offered this spring. Thus, the Change Team approach brings together faculty interested in pursuing new teaching and learning approaches; encourages and supports them in the exploration of new ideas via workshops, seminars, and resource support; and facilitates their sharing of possibilities with others across the college/Center.

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Discipline Dialogues

Ocotillo's Teaching and Learning Group has successfully established a forum for stimulating professional discussion concerning the teaching and learning goals, challenges, and innovations of each particular discipline here at Maricopa. The design of Discipline Dialogues emerged from the belief that if technology is to be incorporated into the classroom, faculty first need to understand its relevance to their own needs in their own areas of instruction and that both inter-and intra-disciplinary faculty sharing is crucial for the educational experience we provide students.

Projected **goals** for the Discipline Dialogues included:

- To Provide opportunities for intellectual and professional conversations among colleagues.
- To support and enhance educational programs.

More specifically:

- To share information and developments in the field.
- To study literature and concepts which are of central importance to the discipline.
- To explore issues of local, regional, national, and international concern to the subjects taught.
- To focus on the process by which students learn.

The **objectives** set forth by the Teaching and Learning Group for these Dialogues included:

1. To create opportunities for Maricopa faculty to build networks with faculty in other institutions.
2. To create an envrionment for interesting ideas, projects, and activities.
3. To support faculty leadership within disciplines related to excellence in teaching and learning.

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4. To clarify the kinds and levels of support that faculty can expect from the MCLI and the Office of Faculty/Staff Development.

The Dialogues were planned by department, division and Instructional Council chairpersons from the colleges as well as Ocotillo Teaching and Learning group leaders from the district office who facilitated and provided support for the overall planning process. Originally, three pilot Dialogues were scheduled: English, Math and Science. However, the Math and Science planning committee decided to merge their discussion groups since so many issues were interrelated. A faculty leader from each planning committee was selected with **Conrad Bayley** (GCC) guiding the English group, and **Baron Arenson** (MCC) leading the Math/Science group.

The format which was chosen by planning committee leaders was relatively informal but with some minimum structure. This minimum structure allows for a creative and meaningful professional growth experience. While most workshops consist of a series of guest speakers giving addresses about teaching, this unique professional growth project realizes that there is an abundance of "expertise" among our own faculty. When faculty are given the opportunity to plan their own development projects, they seem to value collaboration and realize the importance of networking with their colleagues in order to improve their teaching skills.

Each of the Dialogues included lunch for all participants, followed by participation in special interest group topic discussions that were designated by the planning committee. Although technology was not an explicit part of their agenda, these Dialogues naturally evolved with technologically-related concerns. For the English Dialogue Day, these topics includes:

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- **Using the Computer in Writing Instruction.**
- **Peer Revision Groups/Collaborative Learning Techniques.**
- **Open Entry/Open Exit Classes.**
- **"Bridging the Gap"—Between ENG 071 and 101**
- **Outcomes Assessment.**
- **English Humanities Courses.**
- **ESL Instruction.**

For the Math/Science Dialogue Day, these discussion topics included:

- **Hands-On Lab Work vs. Computer Simulation.**
- **Writing in Math and Science.**
- **Are Math Anxiety and Science Anxiety the Same?**
- **The Video Disk in the Classroom and Lab.**
- **Software Issues.**
- **Open Entry/Open Exit Issues.**

The Dialogues were highly participative and professionally facilitated, and provided an excellent opportunity for a cross-district exchange of ideas between faculty. As reported in the March 1990 issue of the Ocotillo Rag, one English Discipline Dialogue participant commented that "making a number of valuable personal and professional connections, a network impossible to create without face-to-face dialogue." Another participant stated, "The open forum...gave commented that "making a number of valuable personal and professional connections, a network impossible to create without face-to-face dialogue." Another participant stated, "The open forum...gave me an opportunity to listen to English faculty talk about teaching, students, and what is happening in their classrooms. As a department chair, that was an opportunity I seldom have." In light of the abundance of positive feedback from participants, these Dialogues will continue during the 1990-91 academic year and expand to other disciplines that are also interested in building learning communities to improve the quality of teaching and learning throughout the district.

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Related Projects

This section describes a number of new projects in various stages of implementation by the MCLI and the Office of Faculty/Staff Development that show promise for supporting and enhancing OTL initiatives.

Classroom Research: The Classroom Research (CR) Project, a joint effort of the Office of Faculty/Staff Development and the MCLI, complements and supports the activities of OTL. CGCCC Change Team members and others who joined in Ocotillo activities comprise the cadre of faculty now trained in CR techniques. CR involves faculty in active solicitation of feedback from students on what and how they learn. The techniques of CR are particularly important to OTL because CR is learner focused. What the students learn, how the students learn, where the students encounter difficulties, and how students react to different teaching approaches inform faculty reflection and introspection on the teaching/learning process.

Kathleen Wothe, of Diablo Valley Community College, led Maricopa faculty in two seminars on CR. In a December, 1989, presentation which was open to all faculty and administrators, Kathleen introduced the basic premises of Pat Cross's model. During an intensive two-day follow-up in March, thirty faculty learned basic techniques and designed CR projects to implement this spring. These faculty reconvened in April to share their projects and outcomes with each other. Several participants collaborated in the writing of a districtwide PEP proposal for a CR initiative that will support a community of scholars who are using CR to further their understanding of the teaching/learning process. This project will support both faculty currently skilled in CR techniques and provide support for increasing participation throughout the district.

Vision: The Maricopa Community Colleges Journal of Teaching and Learning. *Vision's* first issue appeared in November, 1989. This new publication is intended to provide faculty with a forum for sharing what works in the classroom. Colleagues now have opportunities to collaborate with each other to write about their experiences in the classroom, learn how innovation teams weave into a college's instructional agenda, share results of CR efforts, and express opinions on curriculum, technology, and emerging possibilities. Faculty and administrative representatives from the colleges and centers provide leadership and direction to this teaching and learning journal.

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Faculty Notes. A recurring theme we hear from faculty is that they do not know what other faculty are doing that works! *Faculty Notes* is a one-page publication designed to link faculty to other faculty across the colleges/centers. This publication consists of a series of short (one-minute) features on teaching and learning activities and approaches that faculty find especially successful in their classrooms.

La Experiencia: Great Teaching in the Southwest. Another new faculty development project that supports and reinforces the peer-to-peer model followed in Discipline Dialogues is the 1st Annual Maricopa Great Teaching Seminar scheduled for August, 1990. While this concept is new to the district, thousands of community college faculty across the United States and Canada have improved their teaching skills by pursuing the meaning of great teaching in these week-long seminars. Because faculty from many disciplines within MCCCD and other Arizona community colleges will share teaching innovations, this activity should expand the diffusion network.

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Learning Communities. In his 1988 *Encyclical on Effective Teaching and Learning at Maricopa* , Chancellor Paul Elsner expressed his feeling that faculty should be the principal designers of staff development activities with a view toward effective teaching and learning, a philosophy which undergirds Faculty/Staff Development's Lodestar Program. Lodestar funds awarded for mini-grant proposals enable faculty to invite distinguished scholars and consultants to Maricopa to enhance the quality of teaching and learning. This year a successful proposal submitted by Kathy Schwarz of Scottsdale Community College financed two districtwide Learning Communities workshops conducted by Barbara Leigh Smith of the Washington State Center for Excellence in Undergraduate Education. As a result of the information and inspiration provided, some of our faculty will be offering their students integrated learning experiences through linked courses next fall.

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College/Public School Faculty Collaborations. The Think Tank, a kindergarten-through-college consortium of Phoenix public urban educational institutions was formed to combine areas of expertise in order to positively influence delivery of services. A natural outcome of this consortium was formation of a joint staff development committee co-chaired by Maricopa's Coordinator of Faculty/Staff Development and staff development officers from the Phoenix Union High School District and Issac Elementary School District. One of the major projects undertaken by this committee is the establishment of Academic Alliances—permanent, collaborative groups among faculty in the public schools and the Maricopa Colleges who teach in the same discipline. By providing a model and vehicle for collaboration, the English and Math/Science Discipline Dialogues sponsored by OTL this year could potentially serve as the foundation for future alliances that will include public school colleagues.

we could build a network of scholars who can electronically locate articles of interest and then contact the holder of the information for a copy.

Resource Files. Another project currently being explored holds promise for providing faculty and administrators with a quick reference to current articles on teaching, learning, and technology. Most of us have our collection of articles that we find especially interesting, and, most of us cannot lay our hands on the particular article we need when we want it! MCLI staff, along with librarians Josefa Garcia and Georgia Dillard, are investigating the possibility of using the DSire component of the library automation system to provide quick access to our private article collections on teaching and learning. If all goes well, we could build a network of scholars who can electroni-

Closing Comments and Recommendations

"A sanctuary for instructional creativity" is the image we suggest.

While many initiatives are underway, very little evaluation of these efforts has yet occurred. However, through observation and informal communication, we have gathered valuable feedback. Two of the approaches we set in motion hold promise: 1) Change Teams, and 2) Discipline Dialogues. The first is a vehicle for involving faculty in discussions of what could be and then supporting them in the development of their ideas. "A sanctuary for instructional creativity" is the image we suggest. This is perhaps the most challenging of the initiatives to support because of its need to be college focused and interdisciplinary. In a sense, these sanctuaries are an enigma! Sanctuaries for questioning and reflection are the most difficult environments to foster because colleges/centers are often too busy with the practical to explore the theoretical. Yet, the CGCCC Change Team is evidence of the need for and interest in this type of intellectual pursuit.

Another critical problem in establishing campus change teams is the amount of time required to provide support to developing teams. Several weeks of district support staff time were required to plan and conduct the first seminar at CGCCC, and during the year, we had very little time to support team members as they struggled with their roles. Other problems change teams will likely encounter is how to establish credibility and how to find time to pursue their own innovative projects while assuming leadership responsibilities for campus change efforts. Further, difficulty obtaining state-of-the-art hardware hinders exploration and creativity.

College innovation teams can be an effective way to support groups of faculty challenging current practices and considering alternative ways to meet the educational needs of our communities in the 90's.

Evaluation of the effects of campus teams such as the CGCCC Change Team and the SCC E-Team on both the institution and the individuals is critical. College innovation teams can be an effective way to support groups of faculty challenging current practices and considering alternative ways to meet the educational needs of our communities in the 90's. For these teams to be successful, we need to rethink what the literature tells us about change and creativity. Some of the questions we need to answer are:

- Who should be the change leaders? Do they naturally emerge? Should they be department chairs? How are they selected? Who should be involved in the selection? What criteria do we use?

- How do change teams involve all (or most) faculty and staff on the campus?

- What is the linkage between change teams and staff development?

- What type of administrative support is essential for a change team to succeed?

Discipline Dialogues, on the other hand, are not intended to develop new ideas but rather to provide networks for diffusion of innovations. This type of linking of faculty within a discipline requires a relatively small amount of support from the Office of Faculty/Staff Development and the MCLI. Yet as the change literature indicates, the nurturing of this peer-to-peer networking is vital to the adoption of innovations. Strong faculty leadership developed quickly within each of the three pilot Discipline Dialogues. Maricopa is fortunate to have dynamic, creative faculty who continually provide instructional leadership.

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We need timely ways to support innovators. For example, Karen Schwalm emerged as a leader at the English Discipline Dialogue. From her sharing with colleagues came calls for help in adapting and using her Electronic Journals. Change leaders such as Karen are quickly over burdened by calls from interested peers. We need to be able to respond quickly with released time so that innovators can, as Karen suggests, "work with interested faculty one-on-one or in small disciplinary groups."

Our analysis of related projects described in this report leads us to conclude that there exists a symbiotic relationship between our existing faculty/staff development programs and OTL. These projects feed OTL and are nourished by it. Our faculty/staff development efforts are providing many opportunities for learning what others are doing nationwide, and the funding sources that support this constant infusion of ideas are critical for MCCCD faculty and staff. Sabbaticals and travel are essential for us to maintain our leadership role in providing quality instruction for our community.

One of the major sources of satisfaction has been watching an emergence of college leadership in Teaching, Learning, and Technology, signaling the beginning of a new District role—that of designing and modeling processes, building and supporting communities of scholars among our faculty, and promoting excellence in teaching and learning. The groups with which we have been working have shown that, given necessary support, faculty are willing to incorporate appropriate technologies into their instruction. But their determination to focus on technology as a means, not an end, demonstrates that our instructors support the following principle from Dr. Paul Elsner's *Encyclical:* "Technology should be obedient. It should serve excellent teaching and learning, not drive us."

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